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SESSIONAL PAPERS.

VOL. XLIII.—PART VIII.

THIRD SESSION

OF THE

TWELFTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1911.

40940

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1911.

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TORONTO.

LIST OF SESSIONAL PAPERS

PRESENTED TO THE HOUSE DURING THE SESSION.

TITLE.	No.	REMARKS.
Accounts, Public	1	*Printed.*
Agricultural College, Report	29	"
Agricultural and Experimental Union, Report	31	"
Agricultural Societies, Report	43	"
Archives, Report	65	"
Auditor, Statements	54	"
Bee-Keepers, Report	37	*Printed.*
Births, Marriages and Deaths, Report	19	"
Blind Institute, Report, Part of	16	"
Children, Neglected, Report	26	*Printed.*
Colonization, Report	64	"
Corn Growers, Report	35	"
Dairymen, Report	38	*Printed.*
Dairying in Ontario	57	*Printed for distribution only.*
Deaf and Dumb Institute, Report, part of	16	*Printed.*
Division Courts, Report	5	"
Education, Report	16	*Printed.*
Education, Orders in Council	51	*Not Printed.*
Entomological Society, Report	36	*Printed.*
Elections, Returns	50	"
Estimates, 1911-1912	2	"
Factories, Report	46	*Printed.*
Farmers' Institutes, Report	40	"
Farming Opportunities	58	*Printed for distribution only.*
Feeble-Minded, Report	23	*Printed.*
Fish and Game, Report	13	"
Fruit Branch, Report	33	"
Fruit Growers', Report	32	"
Game and Fisheries, Report	13	*Printed.*
Game Wardens, 1909-1910	72	*Not Printed.*
Gaols and Prisons, Report	25	*Printed.*

Title.	No.	Remarks.
Health, Report	20	*Printed.*
Highway Improvement, Report	14	"
Horticultural Societies, Report	44	"
Hospitals and Charities, Report	24	"
Hospitals for Idiots, Report	22	"
Hospitals for Insane, Report	21	"
Hydro-Electric Power Commission, Report	48	"
Hydro-Electric Power Commission, uniform system of accounting, etc.	67	*Not Printed.*
Hydro-Electric Power Commission, Institutions supplied with power by	68	"
Hydro-Electric -Power Commission, damage done to machinery, etc.	69	"
Hydro-Electric Power Commission, how much power called for by, with Ontario Power Company	70	"
Hydro-Electric Power Commission, municipalities which have entered into contracts with	71	"
Hydro-Electric Power Commission, from what date entitled to payment by City of Toronto	74	"
Idiots and Epileptics, Report	22	*Printed.*
Industries, Report	45	"
Infant Mortality, Report	60	"
Insane, Hospitals, Report	21	"
Insurance, Report	10	"
Labour, Report	15	*Printed.*
Land, Forests and Mines, Report	3	"
Legal Offices, Report	6	"
Library, Report	52	"
Liquor License Acts, Report	27	"
Live Stock Associations, Report	39	"
Loan Corporations, Report	11	"
Mines, Report	4	*Printed.*
New Ontario, situation, etc.	56	*Printed for distribution only.*
Ontario Railway and Municipal Board, Report	49	*Printed.*
Ontario Readers, tenders, correspondence, etc	73	"
Ontario Veterinary College, Report	30	"
Provincial Archives, Report	65	*Printed.*
Provincial Municipal Auditor, Report	8	"
Provincial Secretary's Department, employees in	61	*Not Printed.*
Public Accounts	1	*Printed.*
Public Institutions, tenders for supplies for	62	*Not Printed.*
Public Works, Report	12	*Printed.*

Title.	No.	Remarks.
Queen Victoria Niagara Falls Park, Report	9	*Printed.*
Railway and Municipal Board, Report	49	*Printed.*
Registrar-General, Report	19	"
Registry Offices, Inspection, Report	7	"
Secretary and Registrar, Report	18	*Printed.*
Statute Commission, Expenditure on	66	*Not Printed.*
Statute Distribution	63	"
Surrogate Court, Orders in Council	55	"
Temiskaming and N. O. Railway, Report	47	*Printed.*
Toronto University, Report	17	"
Vegetable Growers, Report	34	*Printed.*
Veterinary College, Report	30	"
Women's Institutes, Report	41	*Printed.*
Women's Institutes. Hand-Book	59	*Printed for distribution only.*

LIST OF SESSIONAL PAPERS

Arranged in Numerical Order with their Titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

CONTENTS OF PART I.

No. 1... Public Accounts of the Province, for the year ended 31st October, 1910. Presented to the Legislature, 26th January, 1911. *Printed.*

No. 2.... Estimates—Supplementary—for the service of the Province for the year ending 31st October, 1911. Presented to the Legislature, 31st January, 1911. *Printed.* Further Suplementary Estimates for year ending 31st October, 1911. Presented to the Legislature, 13th March, 1911. *Printed.* Estimates for the year ending 31st October, 1912. Presented to the Legislature, 20th March, 1911 *Printed.*

CONTENTS OF PART II.

No. 3... Report of the Minister of Lands, Forests and Mines of the Province for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 4... Report of the Bureau of Mines, for the year 1910. Presented to the Legislature, 28th February, 1911. *Printed.*

No. 5... Report of the Inspector of Division Courts, for the year 1910. Presented to the Legislature, 16th February, 1911. *Printed.*

No. 6... Report of the Inspector of Legal Offices, for the year 1910. Presented to the Legislature, 10th March, 1911. *Printed.*

No. 7... Report of the Inspector of Registry Offices, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 8... Report of the Provincial Municipal Auditor, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 9... Report of the Commissioners for the Queen Victoria Niagara Falls Park, for the year 1910. Presented to the Legislature, 24th February, 1911. *Printed.*

CONTENTS OF PART III.

No. 10... Report of the Inspector of Insurance and Registrar of Friendly Societies, for the year 1910. Presented to the Legislature, 3rd February, 1911. *Printed.*

No. 11... Financial Statements made by Loan Corporations, Building Societies, Loaning Land Companies and Trust Companies, for the year 1910. Presented to the Legislature, 3rd February, 1911. *Printed.*

CONTENTS OF PART IV.

No. 12... Report of the Minister of Public Works of the Province, for the year 1910. Presented to the Legislature, 16th February, 1911. *Printed.*

No. 13... Report of the Game and Fisheries Department, for the year 1910. Presented to the Legislature, 20th February, 1911. *Printed.*

No. 14... Report on Highway Improvement in the Province, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 15... Report of the Bureau of Labour, for the year 1910. Presented to the Legislature, 22nd March, 1911. *Printed.*

CONTENTS OF PART V.

No. 16... Report of the Minister of Education, for the year 1910. Presented to the Legislature, 22nd February, 1911. *Printed.*

No. 17... Report of the Board of Governors of the University of Toronto, for the year ending 30th June, 1910. Presented to the Legislature, 25th January, 1911. *Printed.*

CONTENTS OF PART VI.

No. 18... Report of the Secretary and Registrar of the Province, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed*

No. 19... Report upon the Registration of Births, Marriages and Deaths, for the year 1909. Presented to the Legislature, 10th March, 1911. *Printed.*

No. 20... Report of the Provincial Board of Health, for the year 1910. Presented to the Legislature, 23rd February, 1911. *Printed.*

No. 21... Report on the Hospitals for the Insane, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 22... Report on the Hospitals for Idiots and Epileptics, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 23... Report upon the Feeble-Minded, for the year 1910. Presented to the Legislature, 22nd March, 1911. *Printed.*

No. 24... Report upon the Hospitals and Charities, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

No. 25... Report upon the Common Gaols and Prisons, for the year 1910. Presented to the Legislature, 15th March, 1911. *Printed.*

CONTENTS OF PART VII.

No. 26... Report upon Neglected and Dependent Children, for the year 1910. Presented to the Legislature, 8th March, 1911. *Printed.*

No. 27... Report upon the Operation of the Liquor License Acts, for the year 1910. Presented to the Legislature, 15th March, 1910. *Printed.*

No. 28... Report of the Department of Agriculture, for 1910.*
*This Report was printed in the Sessional Papers of 1910—No. 28.

No. 29... Report of the Agricultural College and Agricultural Farm, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

No. 30... Report of the Ontario Vetrinary College, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 31... Report of the Ontario Agricultural and Experimental Union, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

CONTENTS OF PART VIII.

No. 32... Report of the Fruit Growers' Association of Ontario. for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

No. 33... Report of the Fruit Branch of the Department of Agriculture, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

No. 34... Report of the Ontario Vegetable Growers' Association, for the year 1910 Presented to the Legislature, 20th March, 1911. *Printed.*

No. 35... Report of the Corn Growers' Association, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 36... Report of the Entomological Society of Ontario, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

No. 37... Report of the Ontario Bee-Keepers' Associations, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 38... Report of the Dairymen's Associations of Ontario, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

CONTENTS OF PART IX.

No. 39.... Report of the Live Stock Associations of Ontario, for the year 1910. Presented to the Legislature, 3rd February, 1911. *Printed.*

No. 40... Report of the Farmers' Institutes of Ontario, for the year 1910. Presented to the Legislature, 26th January, 1911. *Printed.*

No. 41... Report of the Women's Institutes of Ontario, for the year 1910. Presented to the Legislature, 26th January, 1911. *Printed.*

No. 42... Report of the Poultry Institute, for 1910.*
* This Report was not presented in the Session of 1911.

No. 43... Report of the Agricultural Societies of Ontario, and the Convention of the Ontario Association of Fairs and Exhibitions, for the year 1910. Presented to the Legislature, 26th January, 1911. *Printed.*

CONTENTS OF PART X.

No. 44... Report of the Horticultural Societies of Ontario, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 45... Report of the Bureau of Industries, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 46... Report of the Inspectors of Factories, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 47... Report of the Temiskaming and Northern Ontario Railway, for the year ending 31st October, 1910. Presented to the Legislature, 25th January, 1911. *Printed.*

No.. 48... Report of the Hydro-Electric Power Commission, for the year 1910. Presented to the Legislature, 22nd March, 1911. *Printed.*

CONTENTS OF PART XI.

No. 49... Report of the Ontario Railway and Municipal Board, for the year 1910. Presented to the Legislature, 28th February, 1911. *Printed.*

No. 50... Supplementary Return from the Records of Elections subsequent to General Elections in 1908. Presented to the Legislature, 24th January, 1911. *Printed.*

No. 51... Copies of Regulations and Orders in Council respecting Department of Education. Presented to the Legislature, 25th January, 1911. *Not Printed.*

No. 52... Report on the State of the Legislative Library. Presented to the Legislature, 31st January, 1911. *Printed.*

No. 53... Report *re* Game Commission.*
* *Not brought down.*

No. 54... Statements of Provincial Auditor under Audit Act. Presented to the Legislature, 25th January, 1911. *Printed.*

No. 55... Copies of Orders in Council under provisions of Surrogate Courts Act. Presented to the Legislature, 3rd February, 1911. *Not Printed.*

No. 56... New Ontario, Situation, Farms, etc. Presented to the Legislature, 3rd February, 1911. *Printed for distribution only.*

No. 57... Dairying in Ontario. Presented to the Legislature, 3rd February, 1911. *Printed for distribution only.*

No. 58... Farming Opportunities in Ontario. Presented to the Legislature, 3rd February, 1911. *Printed for distribution only.*

No. 59... Women's Institutes, Hand-Book. Presented to the Legislature, 9th February, 1911. *Printed for distribution only.*

No. 60... Report on Infant Mortality. Presented to the Legislature, 7th March, 1911. *Printed.*

No. 61... Return to an Order of the House of the 21st day of February, 1911, for a Return shewing: The number of officials, clerks and employees in the various branches of the Provincial Secretary's Department on (*a*) February 1st, 1905; (*b*) January 1st, 1911; with the salaries in each case. The additional work (if any) imposed on each branch and a statement of what has been accomplished thereby. Presented to the Legislature, 15th March, 1911. Mr. *McCart. Not Printed.*

No. 62... Return to an Order of the House of the 20th day of February, 1911, for a return shewing: (*a*) For what commodities supplied to the Public Institutions under the control of the Province of Ontario the Government asks for tenders by advertisement in the public press; (*b*) The commodities supplied to each of the Public Institutions under the control of the Province of Ontario for which tenders are not invited by advertisement in the public press; (*c*) and what system of purchase is adopted in each case under (*a*). Presented to the Legislature, 15th March, 1911. Mr. *Kohler. Not Printed.*

No. 63... Statement of distribution of Revised and Sessional Statutes, for the year 1910. Presented to the Legislature, 15th March, 1911. *Not Printed.*

No. 64... Report of Bureau of Colonization, for the year 1910. Presented to the Legislature, 16th March, 1911. *Printed.*

No. 65... Report, Provincial Archives, for the year 1910. Presented to the Legislature, 20th March, 1911. *Printed.*

No. 66... Return to an Order of the House of the Tenth day of February, 1911, a Return shewing: (1) The amount expended on the revision of the Statutes from the 14th day of February, A.D. 1910; (2) To whom and on what account were the payments made; (3) The total cost of revision to date and shewing: (4) When will the revision be completed. Presented to the Legislature, 20th March, 1911. Mr. *Proudfoot. Not Printed.*

No. 67... Return to an Order of the House of the Twenty-eighth day of February, 1911, for a Return shewing the uniform system of accounting in respect to the various features of the dealing in electric energy by municipalities having contracts with the Hydro-Electric Power Commission which has been approved by the Government. Presented to the Legislature, 20th March, 1911. Mr. *MacKay (Grey.) Not Printed.*

No. 68... Return to an Order of the House of the Twenty-eighth day of February, 1911, for a Return shewing: (*a*) The institutions under the control of the Province which are supplied with electric power by the Hydro-Electric Power Commission; (*b*) The amount of power supplied in each case, and the date when such power was first supplied; (*c*) The price charged to each such institution for power; (*d*) The cost of installation in each case; (*e*) The system of supplying power displaced by the supplying by the said Commission; (*f*) The cost of the same amount of power under the displaced system; (*g*) The cost price of the plant rendered useless by the change in each case; and (*h*) What other institutions under the control of the Province are to be supplied with electric power by the said Commission. Presented to the Legislature, 20th March, 1911. Mr. *MacKay (Grey.) Not Printed.*

No. 69... Return to an Order of the House of the Twenty-eighth day of February, 1911, for a Return shewing: (*a*) The damage done to the machinery or equipment in any and all transformer stations of the municipalities contracting with the Hydro-Electric Power Commission since the said Commission commenced to transmit power; (*b*) The dates upon which such damage was occasioned and the extent in money of the damage to machinery or equipment in each case; (*c*) The names of the contractors supplying or installing the machinery or equipment so damaged; (*d*) The cause of the damage in each case, together with all reports received by the Government or any member thereof or the said Commission as to the cause in each case; (*e*) Upon whom will the loss in each case fall—Upon the said Commission, upon the contractor or upon the interested municipality. Presented to the Legislature, 20th March, 1911. Mr. *MacKay (Grey.) Not Printed.*

No. 70... Return to an Order of the House of the Twenty-eighth day of February, 1911, for a Return shewing: (*a*) How much power has been called for by the Hydro-Electric Power Commission under its agreement

with the Ontario Power Company, giving date of each notice requiring delivery of power, and the amount called for by each notice; (*b*) The amount of power for which the said Commission is now and has been from time to time liable to pay; (*c*) The amount of Power annually taken from time to time from the Ontario Power Company; (*d*) The amount of power actually transmitted from time to time by the said Commission; (*e*) The dates and duration of all interruptions to the delivery of power by the said Commission to the various contracting municipalities; (*f*) The cause of each such interruption, and all reports thereon received by the said Commission or the Government or any member thereof; (*g*) The amount, if any, of the rebate allowed or to be allowed each contracting municipality in consequence of the interruption of the delivery of power. Presented to the Legislature, 20th March, 1911. Mr. *MacKay* (*Grey.*) *Not Printed.*

No. 71.... Return to an Order of the House of the Twenty-first day of February, 1911, for a Return shewing: (*a*) The municipalities which have entered into contracts with the Hydro-Electric Power Commission for the supply of power; (*b*) The amount of power contracted for by each such municipality; (*c*) The names of the municipalities to which power is now actually being supplied, with the date upon which power was first supplied, the amount of power now supplied, and the amount of power actually used or sold by each such municipality; (*d*) The actual amount for which such municipality being supplied with power has become liable to the Commission, and the date from which such liability runs. Presented to the Legislature, 20th March, 1911. Mr. *MacKay* (*Grey.*) *Not Printed.*

No. 72... Return to an Order of the House of the Eighth day of February, 1911, for a Return, shewing the names of all temporary or extra game wardens appointed during the seasons 1909 and 1910, with the residence and description of each appointee, the amount paid to each for services and expenses, the locality assigned to each, and the number and general nature of reports received from such game wardens. Presented to the Legislature, 20th March, 1911. Mr. *Elliott. Not Printed.*

No. 73... Return to an Order of the House of the Twenty-seventh day of February, 1911, for a Return shewing (1) A copy of the advertisement calling for tenders for the printing, publishing and supplying of "Ontario Readers"; (2) Copies of all tenders received; (3) Copies of correspondence between the Government of Ontario or any official thereof and any tenderer or tenderers; (4) A copy of the contract entered into on behalf of the Government for the printing, publishing and supplying of "Ontario Readers"; (5) A detailed statement of the cost to the Government of supplying to the publishers electro-plates for each Reader; (6) Comparison of the prices of the old textbooks in the Public and High Schools with those of the corresponding text-books in the new series; (7) Amounts saved to purchasers,

estimated on the basis of previous sales and attendance; (8) Methods of safeguarding the quality of the materials entering into the construction of the text-books and their printing and binding; (9) What provinces, if any, have adopted books of Ontario's new series. Presented to the Legislature, 20th March, 1911. Mr. *Musgrove. Printed.*

No. 74... Return to an Order of the House of the Twenty-first day of February, 1911, for a Return shewing (1) From what date is the Hydro-Electric Commission entitled to payment by the City of Toronto for electrical power contracted for by the City from the said Commission, and if (2) The Commission has been paid the amount owing by the City from said date; (3) What amount *per* month has the City of Toronto become liable to pay to the Hydro-Electric Commission for such power, and from what date. If not paid the reason therefor, and is the City liable to pay interest on such arrears. Presented to the Legislature, 21st March, 1911. Mr. *Proudfoot. Not Printed.*

FORTY-SECOND ANNUAL REPORT

OF THE

Fruit Growers' Association

OF

Ontario

1910

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
Printed by L. K. CAMERON, Printer to the King's Most Excellent Majesty
1911.

Printed by
WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Forty-second Annual Report of the Fruit Growers' Association of Ontario.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,
TORONTO, 1911.

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Fruit Growers' Association of Ontario.

OFFICERS FOR 1911:

President ..... D. JOHNSON, Forest.
Vice-President ..... J. W. SMITH, Winona.
Secretary-Treasurer ..... P. W. HODGETTS, Parliament Buildings.

DIRECTORS:

Division No. 1.—WM. ALFORD, Ottawa.
" 2.—HAROLD JONES, Maitland.
" 3.—W. H. DEMPSEY, Trenton.
" 4.—W. H. GIBSON, Newcastle.
" 5.—WM. STAINTON, Oshawa.
" 6.—L. A. HAMILTON, Lorne Park.
" 7.—J. W. SMITH, Winona.
" 8.—A. ONSLOW, Niagara-on-the-Lake.
" 9.—JOS. GILBERTSON, Simcoe.
" 10.—D. JOHNSON, Forest.
" 11.—R. R. SLOAN, Porter's Hill.
" 12.—F. M. LEWIS, Burford.
" 13.—ADAM BROWN, Owen Sound.

Ontario Agricultural College: Prof. J. W. CROW.
Auditor: D. F. CASHMAN, Parliament Buildings, Toronto.

REPRESENTATIVES TO FAIR BOARDS AND CONVENTIONS:

Canadian National: ROBT. THOMPSON, St. Catharines; P. W. HODGETTS, Toronto.
London: D. JOHNSON, Forest; C. W. GURNEY, Paris.
Ottawa: R. B. WHYTE, Ottawa; HAROLD JONES, Maitland.
Ontario Horticultural Exhibition: W. H. BUNTING, St. Catharines; J. E. JOHNSON, Simcoe; ELMER LICK, Oshawa; P. W. HODGETTS, Toronto.

COMMITTEES:

Executive: Vice-President and Secretary, with E. D. SMITH, Winona, and J. E. JOHNSON, Simcoe.

Transportation: W. H. BUNTING, St. Catharines; L. A. HAMILTON, Lorne Park; R. W. GRIERSON, Oshawa; E. D. SMITH, Winona; R. J. GRAHAM, Belleville; WM. RANDALL, Grimsby; J. L. HILBORN, Leamington; J. E. JOHNSON, Simcoe, and the Secretary.

Co-operation: J. E. JOHNSON, Simcoe; ELMER LICK, Oshawa; ROBT. THOMPSON, St. Catharines; ADAM BROWN, Owen Sound; D. JOHNSON, Forest.

New Fruits: Prof. H. L. HUTT, Guelph; W. T. MACOUN, Ottawa; J. W. CROW, Guelph; A. D. HARKNESS, and A. J. LOGSDAIL, Jordan Harbor.

Historical: A. McNEILL, Ottawa; L. WOOLVERTON, Grimsby; HAROLD JONES, Maitland; W. T. MACOUN, Ottawa; W. DEMPSEY, Trenton; R. B. WHYTE, Ottawa.

TREASURER'S REPORT, 1910.

Receipts.		Expenditures.	
Balance on hand, Dec. 31, 1909.	$1,411 07	Fruit Show:	
Members' fees	261 75	Grants to special prizes	$185 00
Fruit Show:		Refunds fruit sold	1,299 35
Sale of fruit	1,377 91	Labor	251 85
Entry fees	100 60	Transportation, storage, etc.	358 33
Incidentals	1 50	Printing	13 00
Legislative grant	1,700 00	Incidentals	19 65
Interest	11 57	Annual Meeting	284 57
		Committees	207 58
		Periodicals	343 50
		Postage	75 00
		Printing	25 50
		Miscellaneous	281 64
		Balance on hand	1,519 33
	$4,864 40		$4,864 40

Show:

Cash for Special Prizes:		
County Northumberland and Durham	$50 00	
Leeds and Grenville	35 00	
Norfolk	50 00	
Ontario	50 00	
		$185 00
Cash to Exhibitors:		
Norfolk F. G. A.	$568 75	
F. R. Oliver	18 75	
W. G. Watson	17 50	
A. Armstrong	5 25	
J. B. Guthrey	29 00	
W. H. Stevenson	3 60	
Isaac Rush	28 75	
Oshawa F. G. A.	326 25	
Mrs. F. F. Reeves	2 25	
Haliburton Women's Institute	1 25	
Whitby Women's Institute	2 20	
H. Jones	84 00	
A. D. Campbell	10 00	
Ontario Government	51 25	
D. Whyte	2 50	
W. H. Dempsey	5 25	
J. G. Brown	10 50	
W. H. Bunting	39 05	
Rush Brothers	22 00	
St. Catharines Cold Storage	66 00	
Mrs. T. Delworth	3 35	
Mrs. J. G. Wait	1 90	
		1,299 35
Labor:		
E. T. Reed	$125 00	
W. F. Kydd	40 00	
R. C. Ferguson	51 85	
E. T. Reed for students	35 00	
		251 85
Transportation and Storage:		
W. H. Harris & Co., 1909 (storage)	$8 74	
S. McIlroy (cartage)	11 25	
Manning Cold Storage (express and storage)	23 04	

W. H. Bunting (freight)	2 23	
E. T. Reed (freight)	19 78	
Dominion Express Co. (express)	9 92	
Canadian Express Co. (express)	36 73	
Norfolk F. G. A. (freight)	38 40	
United Produce Co. (express and storage)	21 20	
Manning Cold Storage (express and storage)	175 33	
J. H. Hurd (cartage)	5 25	
P. W. Hodgetts (freight)	1 29	
Oshawa F. G. A. (freight)	5 17	
		358 33
Printing:		
Bryant Press, cards		13 00
Incidentals:		
Miss McMaster (post cards)	$1 00	
P. W. Hodgetts, meals, car fare, etc.	7 70	
Expenses of apple packers	10 95	
		19 65
Total for Show		$2,127 18

ANNUAL MEETING:

Travelling Expenses of delegates to November Convention, 1909:		
Thos. Berriman	$2 85	
W. J. Schuyler	2 95	
F. A. Goring	2 75	
Jas. E. Parnall	3 10	
W. S. Thompson	2 75	
Robt. Thompson	2 75	
C. E. Secord	2 75	
A. Lawrie	4 50	
H. T. Foster	1 30	
W. F. Olds	2 60	
W. D. A. Ross	5 40	
R. E. Hamilton	2 90	
Niagara District F. G. A.	3 90	
D. F. Cashman (reporting 1909)	50 00	
Travelling expenses of delegates to November Convention, 1910:		
Norfolk F. G. A. delegates	$37 90	
E. F. Augustine	4 85	
F. S. Wallbridge (Director's exp.)	10 70	
B. J. Case (Lecturer) travelling expenses	16 30	
W. S. Blair (Lecturer) travelling expenses	22 05	
Supreme Court I. O. F., rent of hall	20 00	
Chas. Potter (Lantern)	7 00	
Wilson Publishing Co. (Advertising)	12 00	
Farmers' Advocate (Advertising)	5 60	
McLean Publishing Co. (Advertising)	11 67	
J. H. Dunlop (Advertising)	12 00	
Bryant Press (Programmes, cards, etc.)	34 00	
		$284 57

COMMITTEES:

P. W. Hodgetts (Meals of Directors)	$5 00	
C. W. Gurney (Director, trav. exp.)	5 80	
Jas. E. Johnson " " "	7 45	
H. Jones " " "	16 30	
R. B. Whyte " " "	18 00	
W. H. Gibson " " "	5 00	
F. S. Wallbridge " " "	9 25	
A. Onslow " " "	4 35	
F. Metcalf " " "	10 20	
A. Brown " " "	7 70	
E. D. Smith " " "	2 40	
J. L. Hilborn " " "	14 90	

Jas. E. Johnson (Co-op. trav., etc.)	5 45	
D. Johnson (Co-op. trav., etc.)	10 00	
E. D. Smith (R. R. Commission)	19 65	
E. D. Smith (R. R. Commission, Toronto)	5 40	
D. Johnson (Western Fair. Com.)	3 10	
W. H. Bunting (Various meetings)	57 63	
		$207 58
PERIODICALS:		
Periodicals for members		343 60
POSTAGE:		
Mrs. Hubertus		75 00
PRINTING:		
Bryant Press (Letterheads)	9 00	
Wm. Briggs (Envelopes)	16 50	
		25 50
MISCELLANEOUS:		
Exchange	$0 45	
Pomological meeting, C. A. Hesson (Expenses)	199 99	
G. T. R. Excursion	50 70	
J. H. Dunlop (Wreath)	15 50	
Dominion Guarantee Co.	10 00	
Affiliation fee	5 00	
		281 64

Fruit Growers' Association of Ontario.

ANNUAL MEETING.

The fifty-first annual meeting of the Fruit Growers' Association of Ontario was held at the Temple Building, Toronto, on the 16th and 17th of November, 1910.

Mr. James E. Johnson, the President, called the meeting to order at ten o'clock on Wednesday morning.

PRESIDENT'S ADDRESS.

James E. Johnson, Simcoe.

As an Association we again meet this fifty-first anniversary to review the past, and, with the aid which past experiences have furnished us, to plan to carry out a future policy of improvement. The past record of this Association has fully demonstrated the fact that these meetings are not selfish but of a broad, liberal type, obtaining and disseminating information of the greatest value.

There are many subjects on the programme of this meeting which will not receive the time they are justly entitled to, but will receive such consideration of time as will enable us to perfect our plans for the most important subjects for discussion at our Institute Fruit Meetings held in our counties during the winter months, and in preparing this programme it was the aim of your Secretary and President to have a discussion at the end of each subject, in which discussion I ask you to take a part. I believe the man who learns the most at these meetings is the one who tells the most. What he gives he gets back manifold.

In reference to the work of the Association this year, this has been, of course, largely in the hands of our committees. As you know from the price lists sent out and other reports, the co-operative committee has been active in assisting the local associations in their purchase of materials. This committee has worked with the Co-operative Fruit Growers along these lines.

In conjunction with Mr. Putnam, of the Institutes Branch, we have assisted with a large number of fruit institute meetings held all over the Province during the past year.

The Transportation Committee has been at work, but under somewhat of a disadvantage as the Railway Commission has not yet given any decision in respect to the express situation. This has been rather a serious matter and the Association ought to in some way press the matter to a conclusion. The Chairman of the committee, Mr. Bunting, has been gathering definite information in respect to pilfering of packages, which was quite a serious matter in the Niagara District this year. He and the other members of the committee have also been watching the general express situation and the matter will be fully discussed at the convention.

The special committee appointed in reference to the judging standards for fruits has also, I believe, been working under the direction of Mr. Macoun. A special discussion of the results of their work will form a part of this programme.

The Horticultural Exhibition, which now forms one of the leading features of our year's work, was for 1909 a very successful venture. The exhibits were well up to the mark in every respect, those of the box packages being especially good. The Association took entire charge of the receival and storage of all exhibits and

the placing of fruit where the parties owning the same could not attend the Show. The fruit at the close of the exhibition was sold at a price of $2 per box and $4.50 per barrel for all fruit that was packed, including both Falls and Winters. The proceeds from the sale of the prize fruit which remains the property of the Association, covered all expenses of transportation of exhibits, cold storage, cartage, labor, placing the exhibits and other incidental expenses of the Show.

The Association is again looking after this year's exhibition along the same lines, but with some additions to the prize list which it is hoped will render the Show even more educational. Special prizes have been arranged for packing of apples in boxes as well as for five-box displays of fruit. Some additional varieties have been added in the other sections so as to have the display more attractive.

The opening up of special apple shows in various Provinces and States has brought up the question as to whether this Association should not now carry on a show entirely devoted to the apple here in Ontario. The advertisement which would accrue would be far greater than we are now gaining from the present Show, which is of necessity called a Horticultural Exhibition. The apple industry should be large enough in the Province to support such a show. British Columbia has led the way this year by inaugurating an exhibition which is claimed to be larger than any other show previously held on this continent. Ontario must not fall behind, and with her extent of orchards should certainly be able to put up as good an exhibition of this kind as British Columbia with her limited area of orchards.

The Orchard Meeting held by this Association at Burlington this past summer was of great value, and by the large attendance and interest taken, our Association is justly entitled to hold several of these orchard meetings this coming year. I may ask that you as fruit growers from your respective counties do not leave all the work of suggestions to our Secretary, but take a live interest in your own county, and interview our Secretary if you wish such a demonstration held sometime during the summer.

The growers and packers of oranges, lemons, pine apples and box apples are endeavoring to put up each year a more attractive and superior article. An attractive substitute is taken in preference to a scabby, ill-appearing apple, and we must at least keep posted or the king of fruits in the East will be compelled to take a lower position with diminished consumption and declining popularity.

The apple business in the Province of Ontario for the past few years has been on the decline, caused by:

1. Insects and fungus diseases in unknown quantities attacking our orchards.
2. Careless growers not giving their orchards proper care.
3. Apple purchasers purchasing these uncared-for orchards.
4. The Department of Agriculture of the Dominion of Canada being unable to get sufficient funds to employ the required number of Inspectors to enforce the Fruit Sales Act, at the point of shipment. Many of our careless growers will not spray until they are unable to sell their apples for barreling or boxing, as their policy is to lump their orchards for the highest consideration each year. I should offer a suggestion that the fruit growers of Ontario would do well to appoint a committee to interview the Honorable James Duff, Minister of Agriculture, *re* the passing of a provincial law for the inspection of our fruit, and that the Inspectors so appointed also act as instructors and thus encourage the growers in the Province in our future fruit industry. With this improved system our apples grown in the Province of Ontario will soon be reaching the Far West apple consuming markets in attractive packages. Our possibilities as apple growers, with

our cheap value of land, soil and climatic condition, are unequalled in the world. This is splendidly demonstrated by the beautiful display of apples at the Horticultural Exhibition now in process at the St. Lawrence Arena, which will certainly elevate the standard of the apple industry in this Province. This annual exhibition has now been carried on for seven years, each year advancing in quality, improving in packing and growers' display. The committee in charge of the exhibit of Northumberland and Durham have a beautiful exhibit of which every resident in the Province of Ontario should be justly proud, especially the residents of these two counties. The county fathers did good work in granting to this committee the sum of $200 towards this exhibit, the value of which cannot be estimated. We wish them success in securing a larger grant next year.

The St. Catharines Cold Storage Company are also to be congratulated on their annual exhibit. They in the past seven years have done more than any other body of fruit growers towards the success of fruit exhibits and extension of markets.

The counties of Leeds and Grenville, Ontario, Prince Edward and Norfolk are assisting materially in this Horticultural Exhibition.

The Department of Agriculture of the Dominion of Canada has a neatly arranged exhibit of the far north apple district from their Experimental Farm at Ottawa.

The educational exhibits from Jordan Experiment Station and Collingwood furnished by the Department of Agriculture of the Province of Ontario are entitled to more than passing remarks.

The hand of death has dealt quite severely with us during the past year by the irreparable loss sustained by this Association and this Province in the death of three of our past Presidents, Mr. A. M. Smith, Mr. Murray Pettit, and Mr. Wellington, whose names stand first in the history of fruit growers in this Dominion. Only last year the former passed his fiftieth year of membership, an event which received fitting recognition from our members. Again as if to add to the bitterness of our loss comes the death of one of our most promising young members, Mr. H. S. Peart, Director of our Fruit Experimental Station. Cut down in the prime of his manhood, called from a work of value and usefulness only well begun, his untimely removal, if only by its contrast with those already referred to becomes, if possible, a greater source of deep regret.

In conclusion I wish to express my appreciation of the valuable services rendered by our Secretary, Mr. P. W. Hodgetts, who by his untiring efforts as Business Manager has made this Horticultural Exhibition such an educational success, being only a small portion of the valuable work he is doing for the Fruit Growers' of Ontario. Let us one and all render him a helping hand.

MR. GRIERSON (Oshawa): There is a matter I would like to speak of, and that is whether we should appoint a deputation to interview the Minister of Agriculture of the Province with reference to appointing inspectors. Do you think the Inspectors would conflict with the Inspectors appointed under the Dominion Act?

THE PRESIDENT: That is a point it will be necessary to work out very carefully. British Columbia has a provincial law, and I believe Ontario also could work in conjunction with the Dominion in connection with this work. I should think it might be worked out quite successfully.

MR. MCNEIL: They could do the same with regard to the fruit as with the fisheries. They have inspectors both for the Dominion and the Province.

The President then called on the Secretary to read the Financial Report. The Treasurer read the report and on motion of Messrs. Grierson and Jones the same was adopted. The report appears on page 6.

APPOINTING A NOMINATING COMMITTEE.

The President called for the appointment of committees, the first being the Nominating Committee, and named Mr. A. McNeil and Mr. F. G. Stewart as two of the Committee, the other three to be named by the meeting. Mr. Robert Thompson, Mr. Wallbridge, and Mr. Harold Jones were proposed. Considerable discussion ensued.

THE PRESIDENT: I would like to get the voice of the meeting on the point as to whether the six retiring directors be on the nominating committee, or whether two should be appointed by the Chair and three by the members. The President put the question to the meeting, and after a vote was taken, declared that the retiring directors could not be re-nominated. The President suggested, however, that six members retiring should help the Nominating Committee in any way they could.

A YEAR'S FURTHER EXPERIENCE WITH LIME SULPHUR VS. BORDEAUX.

MR. R. R. WADDLE (Simcoe): The subject under discussion is a year's further experience with Lime Sulphur vs. Bordeaux. As far as the first spraying goes it seems to be generally admitted that all should use Lime Sulphur, which will control the fungus best if used in the proper time, but if neglected until the leaves peep out about a quarter of an inch you will fail to control it. This year I have been through several orchards in three counties, and I failed to find any proof that three sprayings of lime sulphur for the fungus is any better than one spraying of lime sulphur and two of Bordeaux. In a close examination of some of the orchards sprayed three times with lime sulphur I found one 90 per cent. free from fungus, while the adjoining orchard, which received the same formula, would have fungus on thirty per cent. of the fruit. In examining the orchards sprayed with Bordeaux I found they differed in the same way, whether from lack of thoroughness, difference in time of spraying, or difference in preparing the formula, it is hard to explain. After all we can figure that the lime sulphur has a few points the better of the Bordeaux for fungus, because, first, it will not cause the fruit to rust; second, we can prepare home-boiled concentrate lime sulphur a little cheaper. Of course this amounts to very little in comparison in spraying for fungus. Now, the only way I would pass an opinion as to which is the best would be to see two like machines in an orchard at the same hour using the two different formulas and watching the results.

W. F. KYDD (Collingwood): As some of you know, the Department of Agriculture took charge of six orchards in the Township of Nottawasaga this summer, and it is from the results shown from six orchards that I will speak. The first spraying was done with lime sulphur when the leaves began to come out, just peeping forth. The material did not come quite soon enough, and we were not able to do all our orchards with 1 to 10. Half the first orchard was done 1 to 10, and the second half was done 1 to 20. We were very sorry afterwards we did not continue the whole thing 1 to 10, because we found we did no damage, but we were afraid we might burn the foliage. The people in that locality were disappointed because we didn't burn the trees. (Laughter.) The next spraying was done all lime sulphur, 1 to 40 with the exception of the halves of two orchards, and they were done with Bordeaux. The Bordeaux was 15 per cent. lime to the barrel, and I

could see no difference in the cleanness of the apples either from scabs or worms, whether it was Bordeaux or lime sulphur. We had no rust to speak of at all, in fact none. Now, the proof of the pudding is the eating of it, and our apples were 85 per cent. No. 1. Probably you will say, how could you get that with only two sprayings. In the first spraying the trees got four gallons of material per tree, and the second spraying after the blossoms fell off about five. Now, I have seen a number of orchards sprayed in my travels this year, and I do not think they had enough material put on them. That is one of the things I think is neglected. This old fashioned way of only putting on a nice little mist is not as effectual as drenching the tree. Now, I think I have taken enough of your time, and I thank you for listening to me. I may say the first spraying was done when the leaves were peeping out and the last when the blossoms were just out, and it was plastered on as if it was put on with a trowel.

M. C. SMITH (Burlington): The Secretary or the President notified me that I was to have five minutes to say what I had to say and I did not think it was necessary to prepare an address. I thought probably I could last that long.

Now, you all know I am a lime and sulphur man. I have done probably as much spraying with lime and sulphur as any man in Ontario, and I have had very good results. I could instance in our own orchards this year. In one orchard in Burlington, when the demonstration was held in September, we bagged almost 1,100 barrels from eight acres, and I think there were only two spoiled apples found in that quantity—not more. One gentleman from Simcoe found one, and the bagging man said there was one more spoiled apple found, and I gave particular instructions to keep all the spoiled apples.

Now, I have travelled very extensively this year throughout the apple-growing section of Ontario, and I have failed to find any Bordeaux sprayed apples that were as clean. I have seen a good many orchards sprayed with Bordeaux that were practically clean, but I believe the cleanness of the fruit depends on the thoroughness of the application. I have no doubt the Bordeaux will control the blight scab, but you have the disagreeable feature of burning. I have seen some very beautiful orchards of apples this year and in my opinion they were very badly damaged from Bordeaux. I am speaking of Simcoe. Mr. Johnson, of course, disagrees with me as to the harm that burning does the apples, but as an apple buyer, it must appear more would be paid for apples that did not have that burn or rust on.

A MEMBER: Did you observe a good many orchards where the apples were burned where there was no spraying with Bordeaux or other things?

MR. SMITH: I did not. I noticed a little rust sometimes. If the stem end of an apple happens to hold a little water you might get a little rust that way, but there is a great difference between rust from water and rust from burning.

I believe further that lime and sulphur puts a bloom and a freshness on apples that you cannot get from Bordeaux, and I believe it is a greater stimulant to the fruit, and I believe the apples will hang on better. I might say we just finished picking out Spies last Saturday, and in one orchard where we packed over a thousand barrels of Spies I don't believe there was twenty bushels of apples on the ground. With all the wind and storms we have had it didn't seem to blow them off. In my opinion a man can get more absolutely clean fruit with lime and sulphur. It has been admitted by the friends of Bordeaux that you must use lime and sulphur for the first spraying, and I believe if you follow that up with 1 to 30 or 1 to 35 you will do better work with lime and sulphur, and you will do it cheaper, and get better fruit. The growers have got to learn thoroughness be-

fore they are going to get good fruit, and if a man has spoiled apples it is simply because he didn't cover them with the spray.

In Nova Scotia this year lime and sulphur was used first, and the only good apples they have got is where they were so sprayed. I have some photographs taken by the Nova Scotia Government, which you can see, of apples sprayed with lime and sulphur, and unsprayed, and Bordeaux sprayed. The Bordeaux did not seem to control the fungus this year and the lime and sulphur did. We always applied arsenate of lead for all the spies first. I sprayed four times using about nine, ten or eleven to thirty before the blossoms opened, and immediately after the blossoms had burst with the same mixture, and probably about a month before I finished.

A MEMBER: What portion of arsenate?

MR. SMITH: Two pounds to forty gallons.

A MEMBER: Did you try any arsenate of lime at all?

MR. SMITH: No, I did not. I used it two years ago.

A MEMBER: Did you find any injury?

MR. SMITH: I don't know that I did particularly. I used it in Bordeaux; I didn't use it in the lime and sulphur.

A MEMBER: Do you use hard water or soft water?

MR. SMITH: Used one or the other. I didn't notice any difference. I use both generally.

A MEMBER: How many gallons per tree?

MR. SMITH: I would say from eight to ten gallons a tree. They are large trees. I would want the trees drenched, and I like to spray with high pressure, and put lots of material on. I don't believe in this fine misty spraying. I believe in a high pressure nozzle so that you can drive it and cover your tree.

A MEMBER: How much did you put on the first spraying?

MR. SMITH: Five or six gallons to a tree, and later when the foliage is on, and the blossoms and fruit, it takes more material. It depends on the size of the tree. I use the Bear nozzle, as it drives a little farther than the others.

A MEMBER: Is the strongest 1 to 10?

MR. SMITH: You can use 1 to 10, or 1 to 11 even, when the leaves show like little lumps. There is no danger of burning at that time. You would think the leaves would be more tender, but I have sprayed when they were out half an inch, and I have never had any burning, and I sprayed nearly every day it was possible to spray. I never saw one burned apple. I found I could control the scab absolutely with 1 to 30 or 1 to 35.

A MEMBER: When did you use the arsenite of lime ?

MR. SMITH: Two years ago I used some in the Bordeaux formula, but I found the arsenate of lead to do better work. It is more easily prepared and it is more regular, and I might also say that applies to lime and sulphur. I would like to see every fruit grower test his lime and sulphur, and then he would know what he was getting. You can't have any variation with commercial lime and sulphur if you test the material, you know just exactly what solution you want, and if you are making Bordeaux you can't get two barrels to test alike. You might get variation in your apple scabs in that way.

A MEMBER: How often do you spray ?

MR. SMITH: I like to spray four times, but one five acre orchard that never was sprayed before I sprayed twice and had absolutely clean fruit, and the five acres was sold for $1,375 on the trees.

A MEMBER: What time did you spray ?

MR. SMITH: Just before the blossoms opened and just after. I couldn't get to it, as it was wet, and I just sprayed it twice.

A MEMBER: Do you think the season would make any difference?

MR. SMITH: You have to spray at the particular time the blossom is ready.

A MEMBER: I mean for the quantity of scab?

MR. SMITH: Well, this is a very spotty year.

A MEMBER: Do you notice some seasons in a great many orchards the worms bore in the side?

MR. SMITH: I did notice that. I noticed the worms working as late as September in the side of the apple. I don't believe it is the moth does it. I absolutely control the moth in the blossom. We hardly find any at all, and we grow 3,000 barrels of apples. We had some side worms.

A MEMBER: How deep did they go in?

MR. SMITH: From an eighth to a quarter of an inch, or sometimes farther. They go just inside the skin, apparently.

A MEMBER: Some of the gentlemen think with those side holes the worms go in?

MR. SMITH: No, you can look and find the end of it. The apple worms bore inside.

A MEMBER: They might get in the apple after they were barreled?

MR. SMITH: Possibly, if they were around.

A MEMBER: Do you think that is a different worm?

MR. SMITH: I do: yes.

MR. PATTISON: I went up to the Simcoe District, Norfolk County, and saw that worm, and all the growers had that opinion. They got two specimens of the Codling moth, and two specimens of that worm, and put them under a microscope, and they were exactly the same worm except in size, and the small worm had a black head instead of a red one, and I came to the conclusion that that was a Codling moth in the embryo state of development, and Mr. Caesar, who had studied the same thing, came to the same conclusion.

MR. SMITH: Well, one of the professors in Washington came to a different conclusion, so there it is. If you spray three times you can get good fruit, and a year like this is the best to do it. Of course if a man has a very large orchard, he probably will have to start to spray a little earlier in order to get over it inside of a month, but I generally wait until they get to the size of a marble or hickory nut before I give them that fourth spraying. I want to get it on the outside of the apple in order to protect it from fungus and that apple worm.

A MEMBER: What is the object of that second spraying?

MR. SMITH: The fungus develops more just at that time than it does earlier. You want to kill the fungus spores, and you kill more just before the blossom opens than afterwards. The first spraying will control the fungus to a certain extent, but that particular spraying is more for scale or oyster shell and blister mite.

MR. CAMPBELL (Morrisburg): I come from the St. Lawrence Valley, Dundas County, where the apple crop flourishes to perfection, that is, the McIntosh and the Fameuse. I think if we control the scab on those two varieties we do a good deal.

Now, I have been doing some work with those two sprays, and I am an unbiased investigator. I have watched pretty closely nine or ten orchards this summer, and in some of those orchards both sprays were used. In three of them just the Bordeaux was used, and I think in three of them just the lime and sulphur was

used, and so far as results go we could see but very little difference. In orchards which were never sprayed before, and I think we plastered it on, we did not get the apples absolutely clean. Probably Mr. Smith will say that we did not put it on thick enough, but at any rate we did not get them absolutely clean. However, I think they got excellent results, and the growers were exceedingly well pleased. In regard to the injury done, I may say that in the orchards sprayed with Bordeaux at one season of the year there seemed to be a very great deal of injury. One man who had a McIntosh orchard of three acres, and he had never sprayed at all, came in one day along in June or the beginning of July, and he spoke in very strong language against the spraying with Bordeaux. He thought there wasn't an apple in his orchard that wasn't injured, and he would just as soon have them damaged with the scab as with the Bordeaux. However, we let him talk, and he sold his orchard afterwards for a very good price, and the buyer never noticed it, and he had been a buyer of some years' standing, so he seemed better satisfied. When Mr. Hodgetts communicated with me in this matter I wrote to this man and asked him to get me some damaged apples, but he told me he had looked over two barrels and couldn't find any. It seems to pass off pretty well, but does not entirely.

Now, in orchard spraying with both materials, as I said before, we could see but very little difference in the results. Perhaps if we had taken areas and counted up the trees we might have seen something in favor of either one or the other. I may say, though, that the foliage was certainly injured to some extent by the use of Bordeaux. We noticed it particularly in a Fameuse orchard. Some sprayed with lime and sulphur (McIntosh apples which went to British Columbia), reflected credit on Ontario. Two other men used lime and sulphur and Bordeaux. Two men who have been spraying for some years have apples pretty nearly clean. They got more injury from the Bordeaux, and they are inclined to use lime and sulphur.

A YEAR'S FURTHER EXPERIENCE WITH LIME-SULPHUR VS. BORDEAUX MIXTURE.

L. Caesar, Department of Biology, O. A. C., Guelph.

In dealing with the comparative values of lime-sulphur and Bordeaux mixture we must consider them first as spring washes and second as summer washes.

Lime-sulphur vs. Bordeaux Mixture as a Spring Wash.

Any person, so far as I can see, who has studied this question, and observed the results this year and for several years back, will readily agree that for the first application, the one just before or as the buds are bursting, lime-sulphur is much the superior spray. This is because it not only does all at this season of the year that Bordeaux mixture can do, namely, destroy the early spores of such diseases as Black Rot Canker, Pear and Apple Scab, Black Knot, Brown Rot and Peach Leaf Curl, but it also does a great deal more in that it keeps under thorough control at least three of our worst insect pests—San José Scale, Oyster-shell Scale, and Blister Mite. What a boon this is to the fruit-growers can only be estimated by visiting orchards where one or more of these pests flourish; and we must not forget that Oyster-shell Scale and Blister Mite have now spread over almost the whole Province, while San José Scale is slowly but steadily extending its boundaries.

Lime-sulphur vs. Bordeaux as a Summer Wash.

Passing on to the really debatable point, of which is the best spray for fruit trees after the foliage is out, I shall first give my own experience in spraying this year, and then draw some general conclusions, based on these and previous experiments, and on information acquired in various other ways, such as correspondence, travel, and conversation with fruit-growers.

I sprayed two orchards this year and partially sprayed a third. One of these belonged to Colonel McCrae, and was situated about two miles from Guelph. The trees were from twenty-five to fifty years of age, had never, so far as I know, been sprayed before, and had received but little, if any, pruning for several years. Most of the orchard was in sod. About one-third of the trees were left as a check; the other two-thirds received three thorough applications of lime-sulphur. No Bordeaux was used in this orchard. The first application was just as the buds were ready to burst, at the strength of about 1 to 10 (hydrometer reading of from 1.030 to 1.035 specific gravity). The second application was just before the blossoms opened, at 1 to 40 (hydrometer reading of about 1.008), plus 2 pounds arsenate of lead. The third application was just after the blossoms fell, with the same mixtures and strength as the second.

Results.

1. *Scab.*—Unsprayed trees, 30 to 95 per cent. scabby. (Almost every apple on the Snows was scabby). Unsprayed foliage, very scabby; some of the crab apple trees lost much of their foliage in July with this fungus. Sprayed trees, 0 to 2 per cent. scabby. Snow apples even in sheltered parts of the orchard were beautifully clean. Sprayed foliage, just as clean as the fruit.

2. *Wormy Fruit.*—Unsprayed trees lost most of their fruit from fungus and worms. Sprayed trees, 5 per cent. wormy. Fruit hung on well throughout season.

3. *Russeting of Fruit.*—No sign of any injury from the spray, the fruit being glossy and well colored.

4. *Injury to Foliage.*—No perceptible burning; on the contrary, foliage was a rich green, clean and healthy, a great contrast to unsprayed trees.

The second orchard sprayed was the experimental orchard at Jordan Harbor. This was not so thorough a test in some ways as the McCrae orchard, because the varieties were less subject to scab, being chiefly Baldwin and R. I. Greening, with a few Spy, Ben Davis and King trees, whereas there were several Snow trees in the McCrae orchard.

The dates of spraying this orchard were somewhat different. The first application, given under the late Mr. H. Peart's directions, was before the buds burst, with lime-sulphur, and was, I believe, thoroughly done. The second was just after the blossoms fell, and was under my directions. In this application I used on half of the orchard lime-sulphur, 1 to 40, plus 2 lbs. arsenate of lead; on one row of 15 trees the same strength of lime-sulphur, with arsenite of lime instead of arsenate of lead; on half of the remaining rows Bordeaux mixture, 3, 3, 40, plus 2 lbs. arsenate of lead; on the rest Bordeaux mixture about 2, 2, 40, plus a little more than 1 lb. of arsenate of lead. This last part was the first to be sprayed and the weaker wash was due to mistaken information at first as to the capacity of the spray tank. About three weeks later the whole orchard, except three trees at one end of each row, received another application with lime-sulphur, 1 to 40, plus 2 lbs. arsenate of lead. This third spraying seemed to make very little difference in the results.

Results.

1. *Scab.*—Unsprayed fruit, 5 to 50 per cent. scabby. Unsprayed foliage, 20 to 90 per cent. scabby. Sprayed fruit, 0 to 2 per cent. scabby. Sprayed foliage, 1 to 3 per cent. scabby.

NOTE.—No difference in amount of scab could be seen in the different parts of the orchard, each mixture, even the weak Bordeaux, having given practically scab-free fruit.

2. *Wormy Fruit.*—Unfortunately I have not yet received the results of the count of clean and wormy apples that Mr. Hodgetts, at my request, gave orders to have made on twelve representative trees situated in different parts of the orchard, but judging from my own observations on September 15th I think the fruit will average about 87 per cent. free from worms of any kind.

3. *Russeting of Fruit.*—None of the fruit was badly russeted, but there was decidedly more russeting on both the Bordeaux plots than on the lime-sulphur, the latter apparently being very little, if any, more russeted than unsprayed trees.

4. *Injury to the Foliage.*—In the row on which arsenite of lime and lime-sulphur was used, 5 per cent. or more of the leaves were rather severely burned, though no permanent injury was done. In the rest of the orchard there was some burning to be seen on most of the trees, but not nearly so much as where the arsenite of lime was used, and not enough to cause any of the leaves to drop. It was somewhat worse on the Bordeaux plot than on the lime-sulphur, and was just as severe on the trees sprayed with the weak Bordeaux as with the stronger.

In addition to the spraying of these two orchards, I sprayed part of the College orchard at Guelph, chiefly as an additional test of whether arsenite of lime with lime-sulphur would burn the foliage. This mixture was used on the trees just before the blossoms opened and again after they fell, and was heavily applied, to make a thorough test.

Results.

1. From the spraying before the blossoms opened, no burning of foliage, or so little that it was scarcely perceptible.

2. From the spraying after the blossoms dropped (Codling Moth spray), very severe injury to both the foliage and young fruit of Montreal Beauty and Hyslop Crabs and to Salome and one or two other varieties of apples. Several other varieties of apples were less seriously injured, but more than one would care to risk season after season.

CONCLUSIONS BASED ON THIS AND LAST YEAR'S EXPERIMENTS, AND ALSO ON INFORMATION GAINED BY TRAVEL, CORRESPONDENCE, ETC.

1. Either Bordeaux mixture or lime-sulphur will thoroughly control the ordinary fungus diseases of the orchard, one apparently being just about as effective in this respect as the other.

2. One mixture remains on the foliage and fruit just about as well as the other.

3. There is very little difference in the price as a summer spray. Bordeaux mixture, 4, 4, 40 formula, costs 5 cents a lb. for bluestone and ½ cent for lime,

4 X 5 = 20 + 4 X ½ = 2 + about 3 cents for labor in preparation = total of 25 cents per bbl. Commercial lime-sulphur at $8.00 per 40-gallon barrel, which is equivalent to 20 cents a gal., costs, when used at the strength of 1 to 30, about 27 cents per bbl. of diluted spray; and when used at 1 to 40 costs 20 cents per bbl. Nothing is allowed for labor of preparation here, because practically none is required.

4. Whenever there is San José scale in the district or where Red Spiders are abundant on the foliage a fruit grower will act wisely in using lime-sulphur instead of Bordeaux mixture as a summer spray, in addition to the spring application of this mixture. It would also be well to use it in the same way if the orchard is badly infested with Oyster-shell scale, because the summer applications are quite valuable against this pest also.

5. Bordeaux mixture is much more inclined to russet the fruit than lime-sulphur properly diluted. In some districts very little damage is done from this cause, and in such districts, unless Scale insects or Red Spiders are troublesome, it makes very little difference which wash is used. In many districts, however, Bordeaux injury to the fruit is quite serious. Professors Scott and Waite, of Washington, D.C., both of whom have been studying this problem, state that of late years from some unknown cause there has been a decided increase in the amount of russeting of fruit and injury to foliage from Bordeaux mixture. The injury to the foliage often takes the form of small, circular, brown spots looking almost exactly like the disease known as Leaf-spot. Both these men seem to think that concentrated lime-sulphur, whether commercial or home-made, is likely to supersede Bordeaux mixture in the near future on account of this injury. When in Michigan this October I visited a famous apple orchard at Fennville and watched the packers putting up the fruit. The apples were very large and fairly free from worms, but were so severely russeted that I could scacely tell a Baldwin from the other varieties. The packers said that owing to the unsightly appearance only a small percentage of the apples would grade No. 1. In cases like these it is very clear that there should be no hesitation in using lime-sulphur instead of Bordeaux mixture.

Precautions that Should be Taken if Lime-Sulphur is Used as a Summer Spray.

1. Arsenate of lead is the only insecticide that we know to-day that is safe to use with lime-sulphur. The combination of these two substances seems not to lessen the value of either. In some seasons and localities arsenite of lime has been used without any injurious effects, but this year's experiments prove that it will sometimes burn very severely, especially in the later sprays of the season. Paris green likewise cannot be safely combined with lime-sulphur.

2. The strength of lime-sulphur that should in my opinion be used for the different applications are as follows:—For the spring applications 1 gallon diluted with water to 10 (if there are no scale insects in the orchard this may be diluted to 12); for the application just before the blossoms open 1 gallon diluted to 30 or 35; for the application just after the blossoms fall (the time for the Codling Moth spray), 1 gallon diluted to 35, or preferably to 40. If a later application is given it should be at least as weak as 1 to 40 if applied at all heavily.

In the above I am taking as a standard a commercial wash with an hydrometer reading of between 1.300 and 1.320 specific gravity. 1 to 10 at this strength

gives an hydrometer reading of 1.030 to 1.032 specific gravity, while 1 to 30 gives a reading of about 1.010; 1 to 35 gives about 1.009, and 1 to 40 about 1.008.

Most of the commercial companies recommend a uniform strength of 1 to 30 for summer use, but I have known several cases in Ontario, and have been informed of several more in Oregon and in Michigan, where this strength was found too strong for the heavy application required at the time for the Codling Moth spray, and I know that 1 to 40 gives excellent results.

If a home-made concentrated spray is used on the foliage, it should be so diluted that each barrel will contain 4 lbs. of sulphur in solution; for instance, if the formula used be 100 lbs. sulphur, 50 lbs. good stone lime and 40 gallons water boiled vigorously 1 hour. It is clear that, as with ordinary care almost all of the 100 lbs. goes into solution, this should therefore make for summer use about 25 barrels of spray. For spring use each barrel should contain about 13 lbs. of sulphur, so that the above 100 lbs. sulphur would be sufficient to make slightly over 7 barrels when diluted.

In conclusion I wish to say that it would be a most desirable thing if a guaranteed standard of strength could be set for the commercial washes and stamped on each barrel so that the fruit grower would be able to rely on the mixture being of uniform density. The standard might read from 1.300 sp. gr. to 1.320 sp. gr., or from about 33 to 35 Beaume. The adoption of such a standard would help the companies as well as the fruit growers.

A MEMBER: How is it they have more rust on the other side than here?

MR. CAESAR: I do not know, unless they have been on it longer.

A MEMBER: Do you think the weather has anything to do with it?

MR. CAESAR: Perhaps. This year has been a serious year for russeting.

A MEMBER: In mixing the solution, has the stirring not something to do with it?

MR. CAESAR: It must be stirred while it is being boiled, and care must be taken to see that the little lumps are broken up. Work them through a screen beforehand, and try to keep them broken up as you go along.

MR. JONES: For the practical farmer, 5 to 40 gallons of water makes it about right. I mean 5 gallons of the concentrated.

MR. CAESAR: That depends on how much it is boiled down. There are not five men I think in this audience who will get by boiling 100 lbs. of sulphur and 50 lbs. of lime and 40 gallons of water a strength that will on the average exceed 1.210. So you see that it is not more than two-thirds the strength of the commercial wash, and you have always to take that into consideration. The difference in the cost is not so great as one might think. I was working it out last night, and I decided if you took everything together there is not much difference. That 40 gallon barrel of home-made will cost you about $6, and the 40 gallon barrel of commercial will cost you close on to $8 at the ordinary price.

MR. THOMPSON: How do you figure that out?

MR. CAESAR: The sulphur will be two cents a pound, and for 100 pounds you have $2. Lime will cost in most districts forty cents a bushel. It will cost at least that. You might allow thirty cents for fifty pounds of lime. That is $2.30. Then I am allowing fifteen cents a barrel for making it, which I think is too low. Twenty cents would make $2.50. Then $1 for each barrel, and I am allowing fifty cents for the cost of your plant, that is to every barrel. Your plant will cost you $7 or $8, or perhaps more. That makes $4. Now every barrel is just two-thirds the strength of the commercial, so you have to add $2 more to each barrel.

That makes your $6, which I think is fair. It was a surprise to me when I made it up.

A MEMBER: Are you speaking of the average man? How about the co-operative associations?

MR. CAESAR: I am not talking of co-operative associations.

A MEMBER: If you were in an association you could cut it down one-half.

MR. CAESAR: One-third, possibly.

A MEMBER: Then you have to have sufficient pure material to compare favorably with the home-made.

MR. CAESAR: The home-made concentrated I find gives good results. I used a lot of it in Jordan Harbor, and I used it at home. A certain American professor is wrong when he said our side worms were not Codling moths. I am certain of it, that a large proportion of our side worms are Codling moths, but there are quite a few of them that are the Lesser Apple Worm. I do not suppose ninety per cent. of this audience can define the Lesser Apple Worm from the Codling worm. They are the same color and the same appearance, and almost identical. The Lesser Apple Worm in this Province I think does not amount to more than five per cent., taking in the side worms and all. The professor is a pathologist, and I do not think made the statement very seriously.

A MEMBER: What is the particular peculiarity of the Lesser Apple Worm?

MR. CAESAR: It causes a large blotch wherever it works on the side of an apple or at the stem of the apple, or at the calyx end of the apple. It does not go in more than a quarter of an inch as a rule. It just works underneath the skin, but feeding near the surface it naturally covers a large area.

A MEMBER: The curculio is a different cut altogether?

MR. CAESAR: The curculio injury in the fall of the year is entirely different from the spring. In the fall they are all feeding punctures, and there is a circle made. I mean to say there is a little hole made through the skin, and then the insect, having a long beak, eats all the flesh it can reach through this hole, and that causes the skin to turn brown. Sometimes it will cut it all out and make quite a large hole.

A MEMBER: When is the proper time to spray for that?

MR. CAESAR: You can control it better by clean cultivation.

A MEMBER: I come from the County of Kent, and we are troubled with scale. If we miss the scale on the first spraying, would you make the lime-sulphur strong enough to kill it later?

MR. CAESAR: The lime and sulphur as a summer spray will help to supplement your spring spray for the San José scale. The young scale appears early in June, but not till June. Your spray for the Codling moth begins usually around the first of June, and by that time you cannot use lime and sulphur very strong. One to thirty-five is as a rule as high as is safe, but Mr. Smith has used in a good many places one to thirty, and I would judge you could use that strength. A great many use one to thirty and get no injury, but some do get injury. If you use one to thirty that is as strong as you can use, and it will supplement the other a great deal.

ORCHARD FERTILIZERS.

Professor Robert Harcourt, O. A. C., Guelph.

I have been asked to say something on the use of orchard fertilizers, because there seems to be a feeling that the time has come that we must use something to supplement the ordinary farmyard manure in order to get the best results.

All plants require at least ten elements in order that they may make full and normal growth. Fortunately, of these ten there are only three, or in some cases four, elements to which we need pay special attention. Usually the soil and the air contain sufficient of all other elements to produce full and normal crops. The three which are sometimes present in insufficient quantities are: Nitrogen, potash and phosphoric acid. In some cases lime may also be deficient, but our experience would go to show that there are very many cases of Ontario soils where lime is absolutely needed.

The function of nitrogen is to produce large leaf and stem growth, and it is a prominent constituent of protein materials. Where there is an abundance of nitrogen we will usually have a deep green healthy-looking plant. Too much nitrogen, however, will over-stimulate the growth of wood and leaf to the detriment of the production of fruit. Potash apparently has to do with the formation and transportation of carbohydrates, starch, sugars, etc., within the plant; consequently, in all plants producing large quantities of carbohydrates potash is required in considerable quantities, or, in big, fleshy-leafed plants we usually find that large quantities of this constituent are essential in producing the best results. Phosphoric acid has to do with the formation and transportation of the protein materials, so that it is said to follow the proteins. Phosphoric acid seems to hasten maturity, and thus may to some extent overcome the retarding effect of nitrogen on maturity. Excessive quantities of nitrogen tend to make leaf and stem growth at the expense of the maturity of the fruit, whereas the phosphoric acid has a tendency to bring on maturity.

Before speaking particularly of the results obtained from the use of fertilizers, too much emphasis cannot be put upon the fact that artificial fertilizers will give their best results only when used along with farmyard manure, and that we should never think entirely of replacing stable manures with fertilizers: rather, they should be used in conjunction with it. Furthermore, the full results of fertilizers can be obtained only when they are used in conjunction with the very best of cultivation; consequently, the presence of humus and thorough cultivation should always be associated with the use of fertilizers.

So far as I am aware, very few continued experiments with fertilizers have been carried out on the fruit crops of this country. Numerous experiments have been conducted in the United States and in Germany. The German investigators seem to have fairly well established the fact that the mineral constituents required per acre for the full development of fruit trees do not materially differ from those required for root and vegetable crops. Repeated extensive experiments have also proven that hoed crops, such as potatoes, sugar beets, etc., make a better use of farmyard manure than fruits. Among the fruits, apples are more successful in gathering their food from the farmyard manure than the stone fruits. Experiments carried out at the Diemnitz Experiment Station and at Strassfurt in Germany seem to clearly indicate that in the case of core fruits, and especially with apples, that fertilizers containing the three essential mineral constituents, nitrogen, potash and phosphoric acid, can be used with profit, and that potash affects the

results more than any other one constituent, nitrogen being assigned the second place, and phosphoric acid the third. It has been repeatedly noticed that when potash was not supplied, even though light dressings of stable manure were made every three or four years, the trees assumed an appearance of those grown under adverse conditions on poor soil; *i.e.*, the growth of wood is arrested and the leaves are small and have an unhealthy color and are covered with yellow spots. After the fruit is matured there is some growth of wood and the next spring there is put forth an abundance of blossom, of which, however, few develop, owing to the lack of proper nourishment. In spite of the fact that there is an abundance of phosphoric acid and nitrogen in the soil, most of the fruit falls off during the summer, and, in consequence, the yield when potash is not supplied will be very little greater than when no fertilizer is used. However, these conditions are not general; some varieties show a marked ability to thrive under unfavorable conditions, particularly in the fact that they are able to throw off the superfluous fruit which the tree is not capable of fully ripening. Lack of nitrogen in the soil has been shown to have a somewhat similar effect upon the development of the fruit, although not so pronounced, while the absence of phosphoric acid is even less noticeable. At Strassfurt, in Germany, in an experiment in which we are given the yields for eleven consecutive years from an orchard, we find that the total fertilizers used on the complete fertilizer plot during this period were worth $166.60. The increase due to the use of these fertilizers was worth $1,190.50, leaving a handsome profit for the use of fertilizers. Where the potash was omitted the results were very much decreased. German experiments have also fully demonstrated that the use of fertilizers has a very marked influence upon the yield of plums. Their results in general seemed to indicate that the yield of stone fruits is more influenced by phosphatic and nitrogenous manures than the core fruits. It is quite possible that this is due to the fact that stone fruits have a large kernel which is rich in phosphoric acid, and as the proportion of kernel to fruit is much larger in stone fruits than in core fruits, the former have the greater need for phosphoric acid. These results have been fully confirmed by fertilizer experiments on peaches reported from the New Jersey Experiment Station.

From a German source we take the following results of a long continued experiment of fertilizers on plums:

The value of the fertilizers during the experimental period of 13 consecutive crops is $193.50; increased yield of crop worth $1,709.05. Profit, $1,515.45. When potash was left out the profit was reduced to $140; without the phosphoric acid there was only $108.57 profit, which was still further reduced to $69.03 when nitrogen was the constituent left out in the experiment. In this particular case it is evident that the lack of nitrogen influenced the results more than the lack of either potash or phosphoric acid.

Quoting again from German investigations on gooseberries, the following results are also very interesting:

The total value of the fertilizers used through 13 continuous years of cropping was worth $203.50; total value of the crop due to the fertilizers, $2,035. It is apparent that this would leave a profit of $1,831.50. When any one constituent was omitted the profit was very much reduced. With most of the varieties used in the experiment potash had the greatest influence, phosphoric acid next, and the nitrogen least. Evidence goes to show that different varieties of the same kind of fruit make use of the various mineral constituents in different proportions.

Strawberries have been found to respond very readily to the application of

commercial fertilizers. A study of the requirements of this crop is not so difficult as that of the other fruits in as much as the strawberry crop does not occupy the ground for so long a time, and therefore experiments do not have to be continued for such long periods. Experiments seem to show that the complete mixture of fertilizers will give the largest yields, but that on ground in good condition the plot receiving no nitrogen gave nearly as good results as where this constituent was added, while if potash or phosphoric acid were omitted the yield seriously diminished.

One point particularly demonstrated in all experiments with soft fruits is that an excessive amount of nitrogen seems to produce soft fruit which will not ship well and which decays early. This is particularly true in wet seasons and with the strawberry.

Regarding the influence of fertilizers on quality and flavor of fruit, experiments seem to show that an abundance of phosphoric acid and potash in the food plant is extremely important. and that, on the other hand, where nitrogen is somewhat deficient the effect on the quality is scarcely perceptible. Considerable work has been done in determining the influence of the several ingredients, that is, the nitrogen, potash and phosphoric acid, on the size of individual fruits. With core and stone fruits the experiments are not far enough advanced to warrant definite conclusions, but with berries a greater number of results have been obtained, and these appear to indicate that the lack of phosphoric acid did not materially decrease the size of the berries, as compared with those grown where a complete mixture of fertilizers was used, but when potash was not supplied the berries were small, and where nitrogen was left out they were still smaller.

There is very little definite data to show that color in the fruit is influenced by the nature of the fertilizers used. It is supposed by many that the use of potash and phosphoric acid will influence the color, and it is quite probable that they do, but I fancy that the influence of these may be very easily overshadowed by the effects of excessive quantities of nitrogen in the soil. It is quite possible, and even probable, that too late in the season there is apt to be so much leaf growth that the fruit is too much shaded, and the leaf and stem growth once strongly started is not easily checked, and as a result we have fruit lacking in color and often really lacking in maturity. It seems likely that if cultivation was stopped early in the season, and cover crops sown, that better results would be got. The cover crop will use up a great part of the moisture and thus check growth and cause ripening of the fruit. If this be true, cultivation in the orchard cannot be stopped at any set time from year to year, or in one orchard as compared with another. The time to cease cultivation is dependent upon condition of the growth, which will be influenced by the nature of the weather and the richness of the soil in plant food.

It is our intention this coming year to place a number of experiments which we hope to continue for a series of years. We wish to see what effect fertilizers will have on the fruits and also to study the influence of fertilizers and other factors on the color of fruit. I shall be very glad to co-operate with anyone who wishes to take up this matter seriously, in order that we may get the experiment started on some really good basis. It is useless to start experiments on orchard fruits unless they are to be continued over a number of years, so that the full effects of the fertilizers on the trees and fruit can be definitely studied.

A MEMBER: What effect does it have on the color?

PROF. HARCOURT: We cannot get any really clear statement with reference to the effect on the color as a result of fertilization. There does not seem to

be any authoritative information on that point. Many of the Germans seem free to admit that the mineral constituents such as potash and phosphoric acid do affect the color, but it is difficult to get proof. These that I have given you are the results of experiments.

A MEMBER: Can you give too much fertilization? Can you overdo it if you use a certain proportion as a guide, or do you only overdo it when you use too much at one time?

PROF. HARCOURT: You can overdo it with nitrogen. As I said before that is the constituent that forces the big leaf and stem growth, and this is not always followed with a good development of the fruit. On the other hand you can put on all you like of potash or phosphoric acid without fear of hurting the plant.

A MEMBER: Can you overdo it?

PROF. HARCOURT: Oh, yes, you can put more fertilization on than you can hope to get money returns for.

A MEMBER: What is the limit?

PROF. HARCOURT: That varies, a great deal depending on the soil upon which it is going to be applied. I have no doubt many of you have land where it is doubtful if the fertilizers would give good results, or they might have to be used in small quantities, whereas on another man's land they would have to be used in large quantities in order to get the best results from it. It depends on the need of the plant in that particular soil. We cannot give any definite formula which will suit all soils. We have to study the characteristics of the crop and the deficiencies of the soil before we can use fertilizers with any degree of success.

A MEMBER: Where you have exceedingly heavy crops every year does the nature of the soil amount to much?

PROF HARCOURT: If you are comparing a light sand to clay you would have to feed your sand heavier than you would the clay, but of course if we have two soils equally rich it is a question of increasing that which is available to the plant.

A MEMBER: Does an apple orchard in clay require potash?

PROF. HARCOURT: It may or may not. We cannot say that, because in clays we have so many conflicting elements or interests, and reactions going on in the soil. I may say all our soils contain enough potash to grow apples for years and possibly hundreds of years to come, but the difficulty is the getting of that potash into a form that is available for the plant. Some soils will bring that into an available condition faster than others, and you might then have crops without the use of much additional food, but if we do not get that condition then we have to add the additional substances.

A MEMBER: Do you think we should first get the soil into proper condition before using these foods?

PROF. HARCOURT: Any man who uses a fertilizer without first getting the soil into the very best possible condition chemically and physically, and every other way, is throwing money away. Now, if you are going to use fertilizers do not start by making them take the place of manure or cultivation. They can only bring you results when you use them with the very best kind of cultivation and under the very best possible conditions.

A MEMBER: Do you think the mustard family, such as turnips, have the faculty of taking the phosphoric acid in the soil and storing it up in their roots so that the plant can get it? Do you know of any experiments along that line?

PROF. HARCOURT: No. On the other hand if you wish to aid a crop of turnips it should be with phosphoric acids in some form. Turnips and rape, and so on, have greater difficulty in getting phosphoric acid than any other constituent—

more difficult than potash or nitrogen. It is possible when they do get it they hold it in their roots, but they do not hold any more in their roots than they get out of the soil. A turnip crop will take a little larger proportion of phosphoric acid out of the soil than will some other crops.

MR. PATTERSON: Do you think the climate has any effect on those things. I mean to say that a series of experiments conducted in Germany and a series of experiments conducted in the United States would be different. I ask you that because a series of experiments have been conducted in the United States with apple orchards, over a considerable number of years, and they have found what retarded the apple growth was the lack of nitrogen. I believe it is Prof. Stewart who puts forward the theory, with which I agree, that whenever an apple orchard is not doing what it should be doing it is owing to some deterrent or something which limits it, such as pruning or spraying or cultivation or some element in the fertilizer, and it is up to the grower to find out what that is.

PROF. HARCOURT: That is correct.

A MEMBER: Is there any different result with fine ground and coarse ground?

PROF. HARCOURT: We have done nothing yet to follow these questions up.

A MEMBER: Is there likely to be very much difference?

PROF. HARCOURT: The fine ground will give results quicker than the other.

A MEMBER: What proportion of phosphoric acid do you recommend in the fertilizer?

PROF HARCOURT: That will depend somewhat upon the conditions, whether it is strawberries or what it is.

A MEMBER: An apple orchard?

PROF HARCOURT: Perhaps the Thomas Phosphate would be as good a formula as you could get. It would come cheaper, and it has this advantage that it will also liberate potash.

A MEMBER: Who handles that?

PROF. HARCOURT: Almost any of the fertilizer dealers would handle it.

A MEMBER: What is the charge?

PROF. HARCOURT: I don't know that I could answer that exactly.

A MEMBER: Down in Nova Scotia they quote $27 a thousand.

PROF. HARCOURT: That is the kind that is used in large quantities down there.

A MEMBER: I understand there is no data with reference to the coloring of fruit by fertilization. I have heard that iron increases the color of fruit. I have large beautiful apples, but I do not seem to get the color.

PROF HARCOURT: We really have no authoritative data on that point. We have lots of statements, but I do not know how much they are to be depended on. It is stated that the mineral constituents will do it, and that other substances may do it. With reference to the question asked a few minutes ago as to the difference in climate, in the discussion, it was stated that the controlling factor in the United States was the lack of nitrogen. We may have different controlling factors depending on the soil, and then there is the ability of the plants to take up the food they require, to be considered. Of course if the soil is very deficient in nitrogen that would be a factor.

A MEMBER: I suppose the potash you get in wood ashes is worth as much per pound as what you buy in the form of fertilizer?

PROF. HARCOURT: You would have to know how much potash there is in the ashes. I believe the land is suffering to-day for this reason that the ashes are sold out of this country. We have analysed wood ashes and found one and a

half per cent., and we have analysed them up to six per cent. You can't tell by the look of them how much is there.

A MEMBER: It would depend on the kind of wood, and the care that has been taken, and the moisture that is in them. If you could buy them on the basis of their analysis then they could be safely bought. If you could go around amongst your neighbors and they were willing to give you their ashes, and if you knew the nature of the wood and the care they had had, then you would be safe in buying them.

A MEMBER: Has applying ashes to an orchard any effect on the color of the fruit?

PROF. HARCOURT: Some say yes. That is just the same thing as saying that potash and phosphoric acid will develop color. We get some samples with double the amount of moisture that there is in others, and this will affect the percentage of the other constituents, and the difficulty is to know what you are buying. We have analysed samples as low as one and a half, and it is being bought on the basis of five per cent.

A MEMBER: Elm gives very good results. If you can get anybody using elm slabs in a mill don't hesitate to get hold of his ashes as fast as you can get them.

A MEMBER: How much would they be worth a bushel?

PROF. HARCOURT: Perhaps twenty-five or thirty cents a bushel.

A MEMBER: Is swamp muck valuable as a fertilizer?

PROF HARCOURT: It has very little value as the constituents are in the wrong condition. It ought to be drawn out and piled up and allow the acids to neutralize.

A MEMBER: Is plowing in a green crop better than manure?

PROF. HARCOURT: That is a question I cannot answer definitely. I believe we can get humus into the ground quicker with a green crop than with farm yard manure, but I believe every time we plow farm yard manure into a field we are re-seeding that soil with organisms that cause decay in that soil, and I think frequent and small aplications of farm yard manure is very much better than large applications at long intervals. However, I think we get a greater accumulation of the humus matter through the plowing in of green crops than with the application of manure, but I really believe when we are putting on manure we are re-seeding that soil with organisms which cause decay, and to that extent the farm yard manure will hasten the availibility of plant food in the soil.

A MEMBER: Does lime hasten it?

PROF HARCOURT: Of course lime is an indirect fertilizer, and some of our soils require a good deal of it, but lime also acts as a liberator. Not only does it hasten the decay of the organic matter in the soil but it also liberates a certain amount of potash. Soils, of course, differ in their nature.

A MEMBER: How much lime would you put on?

PROF. HARCOURT: I do not think it is safe to put more than a ton or a ton and a half of lime to the acre. In the Old Country when they found the value of lime, they commenced using it up to five or six tons to the acre, but they have come to the conclusion that lime without manure will make the father rich and the son poor. Over stimulation can take place in soils as well as in other things. The longer the soil has been under cultivation the more likely it is to need lime.

A MEMBER: Have you had any experience with straw?

PROF. HARCOURT: That would have a benefit on clay as well. The question of the color of fruit is all tied up with the pruning and the rank growth of the

tree, because you cannot get highly colored fruit on a tree so covered with leaf as to keep the fruit entirely from the sun.

A MEMBER: Do you not think the sunshine has a great deal to do with it?

PROF HARCOURT: I think so. I think the pruning has a great deal to do with the color. I think it may be influenced by the mineral constituents, but we have no definite data. I think it would be well for this organization if we could get fertilization experiments started in one or two districts and let them run on for a number of years to see what the effect would be.

A MEMBER: Do you find that fruit which is not colored has not got the flavor?

PROF. HARCOURT: That would really indicate immaturity. Too much nitrogen will mean immaturity and will mean uncolored fruit. Wherever we have a large amount of nitrogen and much leaf and shaded fruit we have lack of maturity, and that is as true with vegetables as with fruits.

A MEMBER: What would you do with an orchard where you have lots of leaf and lots of fruit but no color?

PROF. HARCOURT: I would not use any farmyard manure on that. I would use some of the mineral constituents to balance up. That soil must be rich in nitrogen when you get that big development in leaf. Is there anything growing between the trees?

A MEMBER: No.

PROF HARCOURT: I would put on a good heavy crop to use up that nitrogen.

A MEMBER: The best crop of apples I ever grew was a year when it was planted with corn, but there has been so much said on the subject I didn't do that again.

PROF. HARCOURT: Yes, but you have an off condition. I would certainly advise there to crop between the rows and use up some of that excessive plant food. In your case it might pay to use rye, or something of that nature. It has been said that plowing down good sod is equal to eight tons of farm yard manure per acre, but I have no definite figures to base that on, and I am not giving that as an exact statement.

THE PRESIDENT: I think we should experiment in our own orchards in some systematic way, and we would then know exactly what our own soil is lacking.

PROF. HARCOURT: Of course I will be quite willing to co-operate with you in that work.

ORCHARDS IN PRINCE EDWARD COUNTY.

M. B. CLARK, WELLINGTON.

At the time the Department of Agriculture opened a branch office at Picton and placed a District Representative in charge, very few fruit growers were practising modern methods of orchard management, as was plainly evidenced by the conditions of the orchards generally throughout the county.

Bark-lice were very prevalent and gaining ground each year, leaf blister-mite had arrived and was spreading rapidly, sun scald and winter injury had left footholds for canker, a great many orchards were in sod or growing crops other than apples, and few, if any, were spraying satisfactorily.

Our first representative, R. M. Winslow, was an enthusiastic fruit man and was tireless in his efforts to acquaint himself with the condition of Prince Edward

orchards, and also to create an interest among their owners in improved methods of orcharding.

The first Fruit Institute was held in November, 1908, at which spraying received particular attention. Special fruit meetings were held by the Farmers Clubs throughout the county, and a few fruit men decided to get after their orchards in a thorough manner.

The lime and sulphur spray was used generally for the first spraying, for bark-lice, leaf-blister mite, etc., and the Bordeaux mixture for the summer sprayings. Cultivation, pruning, scraping and fertilizing were also practised, and those who made a worthy effort were delighted with their results. The success attained by these few men became widely known throughout their respective sections and resulted in a very successful and enthusiastic Fruit Institute last winter, at which the many problems encountered by fruit growers in Prince Edward were discussed and made clear by such men as Prof. Harcourt and Mr. Caesar of the O. A. C., Mr. W. McCalla of St. Catharines and Mr. E. Lick, of Oshawa.

This year a large number have handled their orchards in a very thorough manner, using the lime and sulphur for both scalecide and fungicide and adding the arsenate of lead for the insecticide and their results have convinced them that fruit growing can be made the most profitable as well as the most pleasant line of agriculture. There is still. however, a very small percentage of fruit growers taking any special care of their orchards, many hundreds of acres of orchard have been planted in the last twenty years. and no small share of them have died, principally from neglect, although that a large number of them have survived is very noticeable in driving through the county.

There has been a greater effort made at Wellington to encourage the growing of better fruit than at any other part of the county. A small Fruit Growers' Association was formed last winter with about sixteen members, all supplies were furnished at cost, and all possible encouragement and assistance was given to the members, both by the officers and the District Representative. A system of orchard management was discussed and adopted by all. As the season approached for the different operations. meetings were called, at which a full discussion and explanation of the principles of the work in hand was carried on. Special emphasis was laid on the necessity of spraying at the right time, using good material and lots of it, and maintaining a good pressure. The results obtained, both in the quality of the fruit and the improved health of the trees are highly satisfactory.

There is just now a general inquiry among fruit growers as to how they should handle their orchards. Two years of thorough treatment have proven that there are few orchards so far gone but that they can be redeemed, hence all possible assistance should be given to encourage and develop the work already started.

Demonstration work is necessary. especially in spraying and pruning, many hundreds of acres of young orchards are just beginning to bear, the Lime-Sulphur spray has proved to be the great panacea for the many insects and diseases common in our orchards and all that remains to be done is to conduct an energetic campaign for orcharding and the revenue from Prince Edward orchards can be doubled in three years time.

THE PRESIDENT: We have fifteen minutes for discussion upon this paper.

MR. CAESAR: Just to start the ball rolling I would like to mention one or two things about Prince Edward County and their work there. It is only three years, you might say, since they started into this matter of looking after orchards, and the results in that county I think are simply great. If all the counties of Ontario were coming up as quickly in orchard improvements as Prince Edward

County is, and if we had the same enthusiasm as quite a number of the men are showing there, the apple industry of Ontario would go forward very rapidly. It is a delight to go through Mr. Clark's orchard. I went through it last year, and he had some of the cleanest and nicest fruit to be found in the Province.

Mr. Clark: In the last ten years there have been grown a large number of Ben Davis. You will find in the young orchards from five to fifteen years old possibly fifty per cent. Ben Davis. You will find Spies, Golden Russets, Tolman Sweets and the early winter apples among the older varieties. Snows, Baldwins and Greenings are not being set out in that county on account of the climate being too severe. Although the trees are bearing very well, very few are setting them out at present.

A Member: What do they expect to do with Ben Davis?

Mr. Clark: The buyers take a great many Ben Davis. There is no trouble in getting rid of them.

A Member: Have you had much experience of top grafting in these varieties?

Mr. Clark: I have had no experience along these lines myself. I know several who have done it, but it is not generally adopted. A few are doing it successfully, but as a rule those who are setting out apples now are leaving Baldwins and Greenings out.

The President: I may say I have not noticed in our orchards the foliage being injured by the use of the Bordeaux mixture, but I have heard quite a number express the view that the fruit looked far worse a month before picking time than it did at picking time. As the color developed, it showed through the rust. For instance, what our friend has on exhibition here is practically all Bordeaux mixture sprayed. At the same time, I don't want you to think I am condemning the lime-sulphur, because I think it necessary that you should use lime-sulphur, especially at the first spraying. Arsenite of lime with lime-sulphur mixture is something I am not acquainted with.

Mr. Clark: There were a few who used arsenite of lime with lime-sulphur; but they quit it and used arsenate of lead. Just at that time Mr. Caesar sent out word through the papers warning the growers against using it; that there was a possibility of getting some burning. Some got some burning and they quit it and used the arsenate of lead.

Mr. Case, New York: Experiments were carried on at my place with arsenite of lime, with the lime and sulphur, and scorched the foliage terribly, although it outgrew it later and there was really a pretty good crop of apples there, and the crop of apples was clean, but it took about one-third of the foliage. Of course they are very thorough in their experiments.

A Member: In Norfolk County did you use the pure arsenite of lime?

The President: Half Paris green usually, but some arsenite of lime. That is with the Bordeaux mixture. Do not get that mixed up with the spraying with the lime and sulphur, because in Norfolk County we only use the lime sulphur in the first spraying, and then only a few of the orchards, probably not to exceed five per cent.

A Member: What proportion of the arsenite did you use in the water?

The President: I think twenty ounces.

Prof. Harcourt: Did you boil that in?

The President: We boiled it, and mixed it with the lime before we mixed it in our boiler.

A MEMBER: The question I asked about grafting the Baldwin trees was because we found six years ago the Baldwin trees all around died, and the Cranberry also was pretty tender, and part of them went, but we top grafted, and find they are standing still, both the Baldwin and the Cranberry. That is in Prince Edward County.

MR. CLARK: I would like to mention the results we had in using lime sulphur. A year ago we had about fifteen Maiden Blush trees in our orchard and they were very badly infected with leaf spot and blister mite, so I made a special point to give them a good spraying of lime sulphur. I did my work as thoroughly as I knew how, and gave a good pressure on both sides. Mr. Caesar inspected them this year, and we could find a very small percentage, possibly one-half of one per cent. It is mighty hard to find a leaf infected at all, just in one year's thorough treatment.

A MEMBER: When did you spray?

MR. CLARK: Just as the leaves were budding.

A MEMBER: What strength did you use?

MR. CLARK: We used it about one to nine, commercial lime sulphur.

MR. GIBSON: I used the same treatment and it did not do my orchard a particle of good. I got a worse dose of blister mite and scab this year than I ever had in my life. I am sure I have lost over $500 with the blister mite.

MR. CAESAR: A few years ago I tried to get a few good tests for blister mite in Ontario, where I knew there were trees very badly infested, and I examined those under the bud scales. Just before I sprayed the leaves, the buds had actually burst, and the leaves were out a quarter of an inch. I examined underneath those bud scales, and I could find from twenty-five to one hundred of those blister mites under these scales. I gave those one thorough spraying, and all through that summer I was unable to get more than two leaves on a tree that had any mite on them. I might also mention half a dozen places in Prince Edward County where we got excellent results.

MR. LICK, Oshawa: The question was raised a moment ago about lime sulphur not killing blister mite. There must have been something wrong with the lime sulphur put on those trees, for we have abundant evidence for two years in our section of the country that where the home-boiled has been put on thoroughly it has made a thorough job.

A MEMBER: Can you tell me the difference between leaf spot and blister mite?

MR. CAESAR: It is a little difficult to explain what is the difference in the appearance between leaf spot and blister mite. The leaf spot is nearly always a small circular brown area on your leaf, not any thicker than the rest of the leaf. It will vary from one-eighth of an inch to sometimes as much as one-quarter of an inch. The blister mite on the other hand is a slight swelling on the under side of the leaf. In the early part of the season it is a yellowish color and quite small, not any bigger than the head of a pin, on the under surface of the leaf. Then as the season goes on it turns gradually brown and gets to be a reddish brown. On pears it turns black. They are very small, and there is a little elevation on the under surface. The little mites lay their eggs there and they hatch out there. They tunnel in between the upper and lower surface. You would never mistake the two if you saw them side by side. It is chiefly by that little swelling that you can distinguish it.

ORCHARDING FOR PROFIT.

B. J. Case, Sodus, N.Y.

I asked your President last night what he wanted to bring me over here for. I was down in the arena looking at your exhibits of fruit, and I cannot see what you want of me. Now, I am not a scientific man. I had to leave school when I was fifteen years of age and go to work on the farm, so I am just an ordinary fruit grower, who is trying to use all the helps he can get from the scientific men when they make it practical. We have no use for scientific work if it is not practical. I know I have said a good many times, and perhaps I may repeat it, that I hadn't any use for an experiment where you had to count, weigh or measure. I want it so apparent that you have not got to count, weigh or measure a thing in order to know if it is any good to you. If it is so close that you have to count, weigh or meausure, I haven't any use for it. I want it very decided in all experiments I put in myself.

Now, I have 170 acres in fruit of different kinds. Quite a lot of it is young yet and has not borne. I grow all kinds of fruits that are grown in our market except the berries. I used to grow lots of berries, but haven't so many of late years.

A Member: Is it at all possible to have large fruit in connection with small fruit?

Mr. Case: I am hardly able to answer that question. In some instances it is and in some instances it is not. I grew this small fruit, such as berries, when my young trees were growing, and after my orchard got larger we cut them out, and I have arrived at the conclusion after years of experience that I don't want any berries amongst my fruit trees. The time is past when you are going to grow fruit as our fathers grew it; that is, that you can set out a tree and go off and leave it, and come back in ten years or twenty years and gather the fruit. That time has passed, with the increase of insects and diseases. I see my first note is "Keeping Books." I would like to know how many there are in this audience who will hold up their hands to show that they know just how much money they have made out of an apple orchard or a peach orchard or a plum orchard. Is there anybody in this audience who knows and can prove it by figures? I see three. It seems to me the weakest point of the farmer to-day is not keeping books. Any man of practical sense, if you will take a set of books and show him he is losing money, will either change it so as to make money or quit. It is so easily done. Now, I want to beg your pardon for not thinking of bringing over some time cards I have used for several years. They are not copyrighted, so anybody can print them. It is a very simple thing, but I didn't think of it. The card is so arranged that I can tell for the last twenty years, or nearly that, what every man has done every day he has worked for me. It is a card about eight inches wide and perhaps twelve inches long, and good cardboard, so that you can write on it with a pen. Down at the bottom there is a space for the man's name, and the price. Then it is laid off in squares, and the dates are down one side. Then it starts at the top with the hours worked. Then "Apples," "Peaches," "Pears," "Plums," "Grapes," "Berries," or anything a man may keep. Then I take a little stamp, which you can buy for ten cents, with the word "Sunday" on it, and the first thing we do when we start the first of the month is to write down the man's name and the wages he gets, and then we take that stamp and mark the Sundays where they come through the month. Then we take a little file, which

we buy for a quarter, and clip them on. Every man and every horse has a card and it is on this file, and it is kept there for the month. For instance, here is John Legacy, my foreman, $1.60 a day. I start up here at the top, and it shows he works ten hours, and I put down that "10." Then, say he is trimming, and he spent three hours on the peaches, I put 48 cents under "Peaches." Three hours on apples, 48 cents under "Apples." Then the other four hours he was trimming, I put four under there, showing what the man has done. If anyone would like a card, if he sends me two cents for postage, I will send him one, and it will show you just where you are making your money. That is the thing that drove me out of the grain growing years ago, and it is that I have got as the outcome of it.

Now, I started working my father's farm on shares. There was about ten or twelve acres of apple orchard on it and the rest of it was general farming. I found with that system at the end of the year we made about ten dollars an acre on wheat. When we got through and made an inventory and balanced it up, we found that was all we could do, and it was more liable to fall below that than go above it. I could do a little better on barley. I never could make any money on corn; I did well if it balanced. But when we came to that ten or twelve acres of apple orchard, there was $600 or $800 clean profit. It did not take me long to figure it out that it was the fruit business I wanted. However, that is a good many years ago.

The next heading I have is "Trimming." Now you want to know when you have got through here if you have made any money on your orchard or not. One man says, "I sold $2,000 worth of apples this year." What did they cost you? You don't know. You have kept no account of it. Now, suppose Ontario has done the same thing as New York State in regard to trimming. I haven't seen many of your orchards for twenty years. Twenty years ago I went over to Belleville one fall evaporating apples. In these older orchards we have been trimming our apple trees until on the older trees we have got a circle ten or fifteen feet in diameter in the centre of the tree that does not bear anything practically. All these years in trimming, if a limb runs out with some side limbs on, you have cut off the side limbs and kept on sawing it off till you have got that great circle in the centre of the tree that does not bear anything. Just imagine the strain on the limb that runs out fifteen or sixteen feet, or in many instances twenty feet, carrying a bushel of apples. If you have that bushel of apples five feet nearer to the centre of the tree there would be nothing like the strain on it. I claim we have been making a mistake all these years in cutting the short limbs. Where you have a long limb and a short limb, cut the long one instead of the short one, and force the bearing weight back into the centre of the tree. At the same time you must realize you have to thin out those trees. You have got to thin them until the sun will shine on every leaf as far as possible, for every leaf the sun does not shine on is of no benefit to that tree. It is an actual detriment. Now, if you will follow that plan on these old trees, you will find it an advantage. We have stopped setting out these trees that we set thirty feet apart diagonally. We wouldn't do that to-day. There is no trouble to get into that tree and cut the diameter of that tree down three feet a year, at the same time leaving some of those suckers, so that you can force the bearing weight right back.

A MEMBER: What time of year would you trim?

MR. CASE: When the saw is sharp. That needs to be qualified. Remember this fact, that winter pruning stimulates growth and summer pruning stimulates the setting of fruit buds.

A MEMBER: A railway is now coming through our part of the country and

cutting through our orchards, and the people do not know what price to ask for those trees. What is your idea as to the value of trees cut out in that way.

MR. CASE: I can give you instances where orchards have paid year after year 10 per cent. net on a valuation of $1,000 an acre—that is, apples.

A MEMBER: Is there any special time for pruning a tree?

MR. CASE: We trim all winter whenever the weather is mild enough. In fact, we would never get through trimming if we didn't. As soon as we can see what wood to cut out, we trim all winter long. I don't believe it makes much difference.

A MEMBER: In cutting back those trees, how large a limb would you stop at? You would have some limit in cutting them back?

MR. CASE: That is a good point. Of course, most of the agriculturists tell us we must not cut big limbs. I imagine in cutting the big limbs we do shorten the lives of those trees, but we are doing it. We are cutting limbs four inches in diameter. That would be about the limit, unless it is some dead limb.

A MEMBER: Would you recommend that in an old orchard?

MR. CASE: No, I wouldn't, but we are going over the outside of trees and right over the centre, and we are cutting limbs as large as my wrist. You cut the long limb and leave the short one. You will find if you look at the tree that there is a limb runs away out here and there, and you can spare that limb. There is plenty of wood growth there without it.

A MEMBER: How large a limb would you stop at running out?

MR. CASE: Well, I have found instances where they have cut down four inches in diameter.

A MEMBER: They never heal over.

MR. CASE: No, I don't think they do. We most always paint them, but of late years we have been using a thin grafting wax. There are quite a few of our growers who like a thin cement that they paint over them. I have never tried it, but they speak very well of it. Anything that will preserve the wood will do.

A MEMBER: Where they trim all winter, how low does the temperature go?

MR. CASE: It hardly ever goes much below ten or twelve below. I have known it 22 below, but they wouldn't do any trimming at that time; it is too cold.

A MEMBER: Do you have much snow in the winter time?

MR. CASE: Quite a little. Of course, when it is storming, and there is a large amount of snow on the ground, you can't work to good advantage, but we do have a lot of good weather in the winter. They do sometimes work when the thermometer is down to 20. It depends on the wind.

A MEMBER: In planting a new orchard, how far apart would you recommend planting the trees?

MR. CASE: We are setting all our apple trees 20 by 24—Baldwins, Greenings and Spies. I mention these three, because they are big bearers.

A MEMBER: Diagonally?

MR. CASE: No, right in squares.

A MEMBER: Using some of them as fillers?

MR. CASE: Sure, but we do not mix up our apples. I do not take any stock in cross-pollination. I can show you orchard after orchard in our country where they are all Baldwins or all Greenings, and if a man takes care of his orchard it bears just as well as where they are mixed.

A MEMBER: What do you say about all Spies?

MR. CASE: There are very few Spies grown in our section. I was trying to think of a Spy orchard. I have never set any Spies until late years. I have got

a young orchard of Spies, because I take the position we ought to set apples which are in their home, and where we are not going to have another section competing with us, because to-day the transportation facilities have almost annihilated distance. We know we have got to go into competition with apples from the Pacific Coast.

A MEMBER: Mr. Powell has some Spies.

MR. CASE: I am four hundred miles from him. They grow good Spies down where he is. I found when I was down at Poughkeepsie they couldn't grow good Spies. They didn't get the color.

A MEMBER: What treatment would you recommend for an old orchard, probably 25 or 30 years old, set about 28 and 33 feet, and it is now considered too thick? Would you recommend removing a part of these trees, or would you cut back a certain portion from the outside each year?

MR. CASE: Twenty-eight feet is pretty close, but at 33 feet I think you can cut those trees back, but you want to be sure every time you cut a limb that you don't stub off the limb. I don't like that at all.

A MEMBER: You would recommend that rather than taking out every other tree?

MR. CASE: Yes, I think I would. Of course, 28 feet is pretty close. I think any of you will admit a lot of the fruit growers on the other side, and I imagine on this side, are growing paying crops of apples in seven years. It used to take 20 years, but we are learning to do it quicker, and we are coming to the low headed trees.

A MEMBER: Are you getting Baldwins in that time?

MR. CASE: Yes, paying crops of Baldwins in seven years.

A MEMBER: By top grafting?

MR. CASE: No.

A MEMBER: You have rather a longer season than we have.

MR. CASE: I do not think it makes much difference. Your season is not so much shorter than ours as to amount to anything.

A MEMBER: Is it Paradise stock?

MR. CASE: No, but start your tops away down, two feet or two feet and a half from the ground. You understand you get bearing wood three years quicker by doing that than if you start your tops higher. Of course, I have been held back ten years, but I have known for some time those low-headed trees were the best. I have been held back ten years with figuring out some way to cultivate under those trees.

A MEMBER: How do you do it now?

MR. CASE: With the gasoline engine. Sure thing. I had one built for me this year, but I didn't get it out in time to do very much cultivating with it. I hauled most of my apple crop with it. It is coming. We are going to put a gasoline engine in there and clean it from tree to tree up to 24 feet. We are going to put a gasoline engine there that will haul those 12-inch plows.

A MEMBER: Do you mean to put the motor at one end of the row?

MR. CASE: No, right in, so you can put your plows in ten feet without any side draught, but your engine goes right through the centre.

A MEMBER: If you start a tree that low you can't get even a plow under it.

MR. CASE: The plows have got to be made lower. We are going to have them made differently and they will go right under those limbs.

A MEMBER: This gasoline engine you speak of is a compact machine?

MR. CASE: I will describe the one that was built for me. It has an eight-foot

wheel base and it steers like an automobile. All four wheels are forty inches in diameter, and made so that when you steer the front wheels one way the hind wheels go the other, and still we have got the power transmitted to all four wheels. It is a 35 horse power.

A MEMBER: What do they cost?

MR. CASE: The people there are just forming the company and getting started, but probably about $2,000. I understand they have taken out their patents for the United States and have just taken out Canadian patents as well. They are overcoming a lot of difficulties that have been in the way. There is no wear out to the gasoline engine itself hardly.

But that is getting away from my subject. You took me off this 20 by 24 seven years' crop. If you don't do it you are not on your job and that is all there is to it. Now, trees set 20 by 24 will not crowd under 15 years and you have had a chance of having eight crops of apples there. Then when they commence to crowd you take them out diagonally and you have 31 feet each way, and then they are good for 25 years.

A MEMBER: Should you ever let them crowd?

MR. CASE: I wouldn't let them crowd. Just as soon as they commence to crowd I would take them out.

A MEMBER: I understand from your system of pruning you can keep a tree just where you have a mind to.

MR. CASE: I am talking about a big tree that is covering 30 feet now.

A MEMBER: You are crowding your new wood into the centre and cutting out the old wood.

MR. CASE: I don't believe you can take a Greening or a Baldwin and afterwards hold it at 20 by 24 feet. You might, but I doubt it.

A MEMBER: Did you mean 25 additional years?

MR. CASE: No, 25 altogether. Then, if they commence to crowd, you take out the odd trees and you have got them 40 by 48, which is the ideal distance for Greenings, Baldwins, and Spies.

A MEMBER: When your trees are taken out diagonally the first time how far apart are they?

MR. CASE: Thirty-one feet.

A MEMBER: It is said in the humid districts in British Columbia they can grow their trees low, but in our districts, where we haven't humidity, we have to grow our trees high. In other words, we are troubled with all sorts of fungus growths if we don't.

MR. CASE: Well, that is a new thought to me. Yet I have got such faith in the lime and sulphur that I think we are going to hold anything that comes along. Of course, you are breeding a lot of insects and diseases that we do not know anything about to-day that our boys will have to study out later.

A MEMBER: What would you do with an orchard planted 40 feet apart and has not yet started? The trees are three or four years old.

MR. CASE: Are they natural fruit?

A MEMBER: It was intended for a Spy orchard and not grafted yet. They are planted 40 feet apart. What would you do with that orchard?

MR. CASE: I would fill it in, and the reason I would do that is, you may be all right on this side, but in New York State there is hardly one of those cropped. You set an orchard out 40 feet apart each way and you want to do something with that land.

A MEMBER: I should have said it is already planted. I want to know what

you would do with those trees if they were yours, in order to get a good apple orchard.

MR. CASE: I would graft them or bud them.

A MEMBER: Would you cut the limbs, and how low? They have been set three years.

MR. CASE: You will have to ask some of these scientific men.

A MEMBER: You interest me very much when you say a tree should bear in seven years, or ten years. Would you advise cutting those trees and grafting them for a low top?

MR. CASE: How high are they trimmed now?

A MEMBER: Just ordinary, fairly low trimming.

MR. CASE: Well, I doubt if you can get them budded at two feet without anything to draw the sap, and get your graft to live. I doubt it very much. You might in instances, but still I don't think you would have a good result all through the orchard. The only thing to do with that orchard is to graft it just as well as you can and leave enough to draw the sap.

What I was going to say is this, if they set them 40 feet apart you want to try and grow something in between there. On the other side we grow grain, beans, potatoes and general farm crops, and with the rate of wages we have got to pay over there, if they will take my system of keeping accounts to know just where they are, they will find they are just swapping dollars. You are just giving an old bill to get a new one. You put an old bill in in the spring and get a new one out in the fall at the wages we are paying. At the same time look at the fertility you are drawing out of that soil unless you put something back. Now, my plan is clover. I have experimented with all the cover crops that have ever been suggested, and clover gives me the best results. Among those young trees we cultivate till perhaps the 1st of July or the middle of July, or sometimes till the 1st of August, and seed them down with the clover and let that clover grow till the next spring. Then if you wanted a little horse feed I wouldn't object to mowing it for one year through the centre, but if you will keep sowing that clover every year and plowing it under every spring and sow it in clover again, you are storing up a lot of humus and fertility in that soil that that orchard will not forget.

A MEMBER: Will you not make your orchard clover sick?

A MEMBER: Most of them are sick for the want of it.

MR. CASE: That is easily got rid of.

A MEMBER: Is mammoth clover better than the ordinary red clover?

MR. CASE: It strikes me it is a better nitrogen clover. We came to that conclusion.

A MEMBER: Do you prefer clover to hairy vetch?

MR. CASE: Yes. I sowed that one year. Maybe I should have tried it again, but I didn't like it. I had to sow it under the trees, and I had to sow it earlier than I wanted, to get a good growth.

A MEMBER: When do you sow the clover crop?

MR. CASE: On old bearing orchards we commence on the 15th of June or so. We are governed by the growth of the tree.

Now, these men who have been talking about the color of your apples; I have been all through that and have had that same thing. It is too late cultivation, in my opinion. Some of the professors had a great set-to over that, and I put in an experiment of my own, and my plan knocked them silly. If an orchard is making much growth and you get a big rank growing foliage, I stop it right there about the first of June, or certainly by the tenth, and seed it right down, and then I get

color. I am getting better and better color every year. This year I was away from home during that period and they didn't get the seeding done quick enough, and I lacked the color. I think if that clover had been in ten days sooner I would have got much better color.

A MEMBER: Have you got any other fertilizer?

MR. CASE: Yes.

A MEMBER: Why do you think the clover is better?

MR. CASE: Some of you scientific men correct me if I make any mistake, but this is what I have picked up and put into practical use. My theory is this, that you stimulate a big growth, a big foliage, and you shade your fruit. We always mow twice. For instance, you mow this clover by the 15th June and by the 20th July it is all weeds. By the way, I would just as soon have weeds as any other cover crop except clover.

A MEMBER: When do you plow it under?

MR. CASE: Again the next spring.

A MEMBER: Clay soil is a difficult soil to plow in the spring of the year. Do you think it would be advisable to plow under your cover crop in the fall?

MR. CASE: No. That gasoline engine is coming.

A MEMBER: My orchard is clay, and I can't do it in a few days. Do you think the color is a matter of shading?

MR. CASE: Yes. I think that was covered this morning. We have been all over the ground in regard to putting in potash and phosphoric acid, and while it probably does affect the color a little, it takes the sun on the apple, I believe, to get the color, and if there is a big foliage you won't get color. The point is to shrivel up that foliage and get the sun into it.

A MEMBER: Do you think you would get the quantity?

MR. CASE: Not quite, maybe. Now, there is one point I have been pretty fully decided upon that I want to give to you, and that is that an apple tree is like an animal in this respect, that during the incubation period it wants the best of food, and food so it can get it. Now, you know that great care is taken of a stallion during the breeding season, and the mare must be in good health in order to get good results, but as soon as the flesh is formed that feed must be stopped or it will go to fat. Now, I claim with an apple tree you are doing the same thing, and that during the months of April, May and June, when that apple is forming, first the blossom, and the embryo seeds and the apple, and getting ready for the fruit buds during the next year which it forms in July and August, that during that period the tree must get the very best of food which those little rootlets can get hold of, but after that apple is formed and commences to grow, if you keep up that food, it will go to wood. I don't know whether that is scientific, but I can prove it by actual experience anway. I have twenty-five acres of apple orchard, and I have just harvested my eighth crop in succession. But now comes another important point, and that is thinning. I will give you the history of that. We sent some apples to a chemist to have him analyze them so that we might know what they were taking out of the soil, and what we had to give back to the soil, in order to grow those apples. The chemist came back at us and said the flesh of that apple is nearly all water; there is just a taste of potash and phosphoric acid in it, but he said the seeds were high in potash and phosphoric acid. You can see where our reasoning would lead us. We claim it does not exhaust the soil or strain the tree to pump water up out of the soil to make the flesh of that apple, but what does exhaust the soil and strain your tree is to pump potash and phosphoric acid up out of the soil to make the seeds of that apple, and the bigger apples you grow and the

less seeds you grow the less you exhaust your soil and strain your tree. Now, how are you going to do it? The great point is to get those apples off, and we started in September. They may come off in July. We tried to save them, but they must come off, and I pulled off hundreds and hundreds of bushels this last year, and have for three or four years. Now, the point is here, you can go out here among your Baldwin trees that have borne a crop of apples—last October you could anyway—and you could find fruit buds there, but you go there next spring and see if you can find them? And even if they do come through off comes your blossoms or your apples; they will not grow. But if you will carry those trees through in a healthy condition, and do not let them overbear, what few buds you have got you can carry through and they will fetch you in a crop of apples the next year.

A MEMBER: What time would you start?

MR. CASE: Just as soon as the chief drop is over and you know what you have got.

A MEMBER: Do you use commercial fertilizers?

MR. CASE: I certainly do, and Dr. Jordan and Prof. Hedrick and I have had many a battle over it. They claimed at the Experimental Station it didn't do a bit of good, but I never grew such crops of apples until I used commercial fertilizer. I do not use very much barnyard manure. I kept a lot of cows there for years and years and I couldn't make them pay, and I thought they ought to pay, and I got them to a point where I reckoned about $2 a load for every load of manure, and still I could not make those cows pay. The last year I sold my butter for 30 cents a pound in Rochester, nearly all of it, but when you take your inventory at the end of the year it tells you whether you make any money or not, and I never could make any. Then I sold all my cows but two. One I couldn't sell and the other I wouldn't. Now, you take those things and figure them in that way from a fair business standpoint, and you will find where you stand.

Now, as to the fertilizer question: I use a little barnyard manure, but very little. I like to put a little on every year. I use the clover as I have told you, sowing it so that my orchards now are all covered with a mat of clover and weeds and stuff that we have mowed. We have mowed it twice.

A MEMBER: Do you keep the clover that you mow?

MR. CASE: No, sir. We leave it out there till spring and plow it all under.

A MEMBER: Would you plow it late in the fall?

MR. CASE: I think you are losing a whole lot of fertility the whole winter long. It is nature's way that that land should be covered during all the winter. I am talking about these orchards being cultivated. Of course, it is different if you have an old tough sod. Then I use 112 pounds of sulphate of potash and 600 pounds of ground bone per acre. You ask me why I use sulphate instead of muriate. My land is retentive; it is naturally wet. I have got miles and miles of underdraining, and a lot more to put in yet. I try to get a drain between every row of trees if the land is very wet. Of course, that is not necessary for the land where it is dry, but I run my drain through the hollows, and then run the other way, a three-inch tile between every row of trees, leading into the main drain.

A MEMBER: How old are your apple trees?

MR. CASE: There was one orchard was set there in 1853. It is 58 years old. Another one was set in the fall of 1852, and another was set in the 60's. One was set in 1881 and another in 1882. That is the bearing orchards.

A MEMBER: Were those underdrains put in then?

MR. CASE: No. Some of them have been in 20 years.

A MEMBER: Are your trees set 20 x 24?

MR. CASE: We only have been setting them 20 x 24 for a few years. My father set out the orchard that was set out in 1853 and he set them 33 x 49½. Of course, I have been sorry that he did. The 33 feet we have had to keep cutting, but, of course, with 49½ feet there is room to drive through yet.

A MEMBER: Do you think there is any difference between grafting a tree and budding?

MR. CASE: There is a great difference. I don't understand budding very well.

A MEMBER: I heard the other day that winter killing could be caused by being grafted instead of budded.

MR. CASE: I don't know much about it.

A MEMBER: I would like to know what we can make. I know one tree that raised 18 barrels of apples and the tree was over 100 years old. I would like to invest in it, if you can prove that all trees will bear 18 barrels per year. (Laughter.) I have got a 25-acre orchard in which was planted 2,900 trees 30 years ago. A great many trees have died down, so that I believe there are about 2,000 now. Would you take the orchard as a gift?

MR. CASE: Sure. I don't take much stock in the 18 barrel business, but there is no trouble in making an ordinary tree bear four or five or six barrels. We all know that can be done, and if that will not figure up enough money, I think you are pretty grasping.

A MEMBER: Some trees bear 23 barrels.

MR. CASE: That is 69 bushels. I have known in my life of a few of those tremendous big trees that have 40-foot spreads, and occasionally I have known them to produce 50 bushels, taking those that drop on the ground and everything, but that is very exceptional.

A MEMBER: If you have a great many on a tree one year will you not get only a few next year?

MR. CASE: Yes.

A MEMBER: I would like to know at what depth you put your drain in your orchard.

MR. CASE: Nothing less than two to two and a half feet in the shallowest place. Of course, you can't get them all the same depth if your land is rolling.

A MEMBER: Would it be necessary to plant one year old trees in order to cut the heads down that way?

MR. CASE: I think we are all coming to that.

A MEMBER: With reference to that commercial fertilizer, do you use the treated or untreated, or do you put it on raw?

MR. CASE: We use what is known as bone meal.

A MEMBER: Is it treated with sulphuric acid?

MR. CASE: I cannot tell you.

A MEMBER: Do you mix your bonemeal and potash together first?

MR. CASE: No; there is not a man who could live in the same building if you did.

A MEMBER: We have not found out if there is any profit in raising apples yet?

MR. CASE: Now, there have been experiments carried on on a farm near Rochester, where they have ten acres of apple orchard, and they have cultivated half of it and have half in sod. You will find a controversy between Professor Hedrick and Mr. Collingwood in a paper called "The Rural New Yorker," where Mr. Collingwood advocated the Grant Hitchings system and Professor Hedrick advocates the cultivation of orchards, and to clinch the argument he instanced an

orchard where half was cultivated and half was sod, where accounts were kept by the Experimental Station, and it was proved that the five acres of cultivated apple orchard paid a net profit for four years of ten per cent. per year on a valuation of $1,000 per acre. You can find that in the files of "The Rural New Yorker" over Professor Hedrick's signature. Now, don't whistle when I tell you this story. I took four years and I struck 14½ per cent. per year on a valuation of $1,000 per acre. Now, where is there any business equal to growing apples?

A MEMBER: Do you cultivate?

MR. CASE: Yes. It is a mixture between the cultivated and the sod. I stop cultivating between the 10th and 15th June.

A MEMBER: Do you remember the figures for the sod cultivation?

MR. CASE: No, but it is much less.

A MEMBER: Do you cultivate every year or let it remain for some years?

MR. CASE: I cultivate every year, but stop yearly.

A MEMBER: How deep do you plow?

MR. CASE: Just as shallow as we can plow and turn the sod under, four or five inches. If we had some tool for cutting off that clover I wouldn't plow at all. In fact, I have not plowed my vineyard for many years. (Applause.)

MR. A. MCNEILL (Ottawa): May I be allowed the privilege of moving a vote of thanks to Mr. Case. Somehow or other he appeals to me. This is the first time I have had the pleasure of hearing him, and it strikes me he is one of the right kind. He is one of the fellows who is doing things and not merely thinking them. Thinking is all right. It has got to be done. Every castle has got to be in the air before it comes down to earth, but Mr. Case's address has been particularly interesting to me, because he has gone into this thing and has given us his rich experience, and has done it in a way that goes to the bottom of our hearts. Now, I am further pleased, as I believe he has modern methods, according to the professors. I rather like the professors. I have got a sneaking regard for them, although in public it does not do to admit it. Mr. Case has got the right idea, and I am particularly pleased, because I have a couple of thousand trees planted in exactly that same way, low-headed, close together, smaller trees and more of them on the acre, and easy to spray and easy to pick and easy to prune. It is perhaps because I am doing just as he did that makes me think so, but he has made an impression upon us, because he has actually done these things, and he can indulge in automobiles. You cannot get around the argument of a man who has got an automobile. (Laughter.) Therefore, I have the sincerest pleasure in moving this vote of thanks to him. I would also like to add that this is one more "case"—(laughter)—and it is a hard case to get around, when we can welcome a brother from the other side of the line at this particular time when there is so much turmoil and unrest in Europe and in America, and I think we cannot do too much to band ourselves as brothers together. We must all come to the conclusion that we are brothers, and we must stand together for the betterment of the world, and Mr. Case is an apostle of that kind.

MR. GRIERSON: I have much pleasure in seconding the motion.

The President put the motion, which, on a vote being taken, was declared carried.

ONTARIO APPLE SHIPPERS' ASSOCIATION RESOLUTION.

MR. NESBITT: I have the honor to represent a body of men who in the past have purchased between 750,000 and 850,000 barrels of apples in the Province of Ontario. The situation has been getting worse and worse from year to year until finally we have decided, which the resolution I will read to you directly will show, that unless we can get apples that have been sprayed it is the intention of the great majority of these people who are buying the apples to go out of the business. To a certain extent perhaps the speculator has been to blame. We all know, and I am not blaming the grower of apples one bit, he was always asking any kind of an old price for any kind of an old apple that grew upon any kind of an old tree, and you always found some person who was buying apples as representatives of people in Great Britain or people interested in Ontario—you always found some person ready to pay those prices. Now, if there was a normal crop of apples this year, and I think I am talking to growers who know this, you could not have sold the crop that was grown upon the trees, because the men who are representing the large interests would not have bought them. However, as it stood the crop was very low, and we knew it in the month of July. It was estimated about 60 per cent. of the crop of last year was grown east of Toronto, and 20 per cent. of the crop last year was grown west of Toronto. As a matter of fact there has been less than that. Nevertheless, with that shortage in their minds their buyers went out around the districts where these apples were to be bought, especially east of Toronto, and where they found orchards that were sprayed they went into them and tried to make a purchase. The orchard immediately adjoining that which was not sprayed they did not waste any time over it at all. They secured as many apples as they could that were sprayed, but the crop was so much shorter than they expected they went back the second and third and fourth time, and eventually picked up all the fruit that was to be found in these orchards that were not sprayed. But that kind of thing will not obtain very much longer, and the result of the conference we held this morning is this: "Moved by Mr. Shourds, of Wellington, seconded by Mr. Douglas, of Newcastle, that the members of the Ontario Apple Shippers' Association agree for themselves that they will not purchase apples from any grower who does not spray his apples with lime and sulphur and arsenate of lead, or some other equally good insecticide." That was passed unanimously. The proceedings of the Apple Shippers' Association will now be mailed to some of the larger growers and other co-operative associations in Ontario, and what the result may be I don't know; but I can tell you now that I have attended a great many meetings of apple buyers in the last ten or twelve years and I have not seen so unanimous a feeling in all my experience as was shown yesterday and to-day, and we have determined that if people will not grow good apples we do not want them at any price. A large proportion of them, or a considerable proportion of them at any rate, ought to be put in evaporaters, but we do not get a chance to get them there. The buyers, on the one hand, and the farmers on the other, are forcing all kinds of stuff into barrels, and the result is we are losing the reputation that Ontario has had for apples. It appears to me you are up against a serious condition, as compared with British Columbia and the Pacific Coast, and the sooner you recognize it the better. We have the advantage in some ways over these places on the Pacific Coast. We have got a better flavored apple, and we have got a better Spy than they can produce anywhere on the continent, and why we do not take advantage of it and get the results is beyond my comprehension.

THE CHIEF DIFFICULTIES IN THE SUCCESSFUL SHIPMENT OF FRUITS.

W. H. Bunting, St. Catharines.

I want to congratulate you upon this very enthusiastic and largely attended meeting that we are having here in Toronto on the fifty-first anniversary. I have been wondering whether it was the popularity of the presiding officer or the awakening that has taken place in the Province of Ontario that is responsible for it. There is another factor in connection with it that I have noticed, and that is the very broad and complacent smile on a great many of our growers who have come up to our convention after a profitable season. The gentlemen who are here to-day are the men who are practising the methods that the last speaker has urged upon the growers of the Province of Ontario, namely, the spraying of the orchards. I want to say for Mr. Nesbitt's information that I think the resolution which he has presented will meet with the hearty approval of every gentleman here present, and that we will, as a body, only too gladly support any further measures that will assist in increasing the number of people who will take the best of care of their orchards. It is the only thing that can be done with any degree of satisfaction, and I am sure if persuasion and education will not accomplish that work perhaps a little coercion on the part of gentlemen like the Apple Shippers' Association will have a beneficial effect. There is another feature in connection with our Exhibition and Convention this year that has struck me as a very good one, and that is the very large number of intelligent young men that I have seen about the Exhibition for the past few days and during our Convention to-day. It speaks well, I think, for the future of fruit growing in the Province of Ontario that we have joining the ranks of the Ontario Fruit Growers' Association the flower of the yeomanry of the Province of Ontario, and I feel certain while there are a number of us who are getting gray in the service, and who perhaps are getting a little too old to learn new methods, that the hope of the fruit growing industry of Ontario rests with our young men, and I feel, sir, it is in good hands.

The Secretary has placed me on the programme to speak for a few minutes with reference to the chief obstacles in the successful shipment of fruit. The Secretary has enlarged upon my subject, and I had not proposed to-day to speak upon the chief obstacles connected with the shipment of fruit, but only a few of those obstacles with which we have to contend. This is a very large subject, and to undertake to discuss all the obstacles and all the various ramifications that come up in connection with placing our fruits on the market in the best condition would be too big a subject for me to handle and would take up too much of our time during the present session. However, there are two or three things I would like more particularly to refer to and emphasize. As I take it there are three parties to this transaction—the producer of the fruit, the carrying company, the transportation company, the railway or otherwise, as the case may be, into whose hands we are obliged to place our product, and then the man at the other end, the customer or the ultimate consumer. Now, in order that this transaction should be successful it must, in the first place, be satisfactory and profitable to the producer. In the second place the middle man, the carrier, must have a fair and reasonable return for the services rendered. In the third place we must have a satisfied consumer at the other end, and one who is prepared to repeat the operation of ordering more of the same commodity. Unless that transaction is carried out on that mutually satisfactory basis, if any of the links of the chain fail, it seems to me, to a very

large extent, the whole transaction falls to the ground. This Association was formed for the purpose of educating the Fruit Growers' of this Province in the very best methods of producing fruits of the very best quality. For 51 years we have been preaching the gospel of good tillage, the selection of good varieties, care in handling, good packing, and all the other things that pertain to the production of first-class fruit. Sometimes progress has been slow, but I think, Mr. Chairman, that I am well within the mark in saying that the rank and file of the members of the Ontario Fruit Growers' Association to-day are engaged conscientiously in an endeavor to do the best they can in these respects. While there are some things we would like to see improved, while there are many of our neighbors and friends who do not attend these meetings and are not connected with our organizations, and who are not endeavoring to do as we would like, yet we feel there has been great progress made and we have hopes for the future. When it comes to the next factor in the transaction, that is the carrying companies, as many of you know, during the past ten or twelve years through this Association, through this Committee and through its members, we have been engaged in an effort to improve the conditions that obtain as to the carrying of our perishable fruits, not only in America, but across the ocean. Some progress has been made. Better rates have been obtained. I think this Association was one of the first Associations to move in the appointment of the Railway Commission, and we have it to our credit that we supported that movement and succeeded in having the Railway Commission appointed, a body of men who have succeeded in doing untold good, not only in our own industry, but to all the commercial activities of this Dominion of Canada.

Now, in connection with these efforts, we have, as I say, succeeded in getting some improvements and some redress, but there are still some things which require attention. One of the things I wish to refer to here is in connection with the delays in transhipment of fruit by the fruit service. Some years ago, in pressing our claims before the Railway Commission, one of the things we asked was that responsibility should be fixed in connection with delays connected with the transhipment of fruit by our fruit service, and that the Railway Companies give us a schedule of shipment. They tell us they will, at the present time, endeavor to place our fruits in the Winnipeg market, for instance, with a schedule of 4½ days; they give us a schedule of 24 hours to Montreal from the Niagara Peninsula; they give us a schedule of 12 hours to the city of Toronto. Now, it is reasonable to expect that these schedules should be carried out, and if they are not carried out that the responsibility for failure to carry out those schedules should be fixed. Now, as a matter of fact, during the past year there has been a good deal of difficulty in connection with this very point. Instead of a 4½ day service during the early part of the season, 7 and 8 and 9 days frequently obtain. Instead of a 24-hour service to Montreal it was frequently 36 and 48 hours, causing the bunching of cars in the Montreal market. Instead of a 12-hour delivery to the city of Toronto, an 18 and 20-hour delivery was frequently the case. These things caused a very great deal of loss and damage to the shippers. Now, it seems to me that these matters should be pressed still further home to the Railway Commission, if they have jurisdiction in this matter, and I have reason to believe they have jurisdiction, and that the responsibility of these delays should be fixed where it properly belongs. So much, sir, for the freight end of the matter.

As far as the rates are concerned, I think we have nothing to complain of in connection with the freight rates to the various points which I have mentioned. There are some details which might be improved upon in that respect in connection with shipments farther west.

Now, there is another phase of the matter. It is not possible for us to handle all our goods in bulk in carload lots. It is necessary, owing to the nature of circumstances, that a very large proportion of our shipments should be carried by the Express Companies of this country. We have a number of Express Companies who are operating, and the very facts that have been shown in the enquiry before the Railway Commission, that these Express Companies have not only been making 14 per cent., as Mr. Case spoke of with reference to his orchard, but three or four times that percentage has been made upon the capital of those companies, and those revenues have been made upon the products we have furnished, gives us an idea what they are doing.

Now, in connection with the handling of fruit by express the statement has been made frequently that this service is unsatisfactory, and to-day I wish to emphasize this fact that the service during the past year has been unsatisfactory, and more than that, that in connection with one of our companies that no very great effort has been made to improve the service, and that while this matter has been the subject of protest for years, the same thing has obtained from year to year. We are practically to-day where we were a number of years ago in this respect. During the past year it has been my privilege to endeavor, personally, to cater to a private order trade by express, and I have had very great difficulty in conducting that business with satisfaction to my customers largely from the fact that conditions, over which I had no control, were of such a character that dissatisfaction arose amongst my customers. In connection with that matter I was obliged finally to address the following letter to the Chairman of the Railway Commission. With your permission, Mr. Chairman, I will read this letter:

"The Honorable Mr. Mabee, Chairman of the Board of Railway Commissioners, of the Dominion of Canada, Ottawa, Ont.:

"Honorable Sir: I am taking the liberty of writing to you at this time in connection with a matter, which in its indivdual aspect may seem somewhat trivial, but which effects to a greater or less extent all those who are engaged in the transhipment of perishable fruits by the Express Companies of this country.

"It would seem that notwithstanding all the care that may be taken by the producer of fruit to select and pack his fruit in a careful manner, that when it is handed over to the Express Companies for carriage, it is subject to depredation and pilfering by the employees of the said companies. This condition of affairs has been brought to your notice in a general way during the Express Enquiry.

"During the present season, however, I have been engaged, to some extent, in catering to a select list of private customers scattered over a considerable area. In a number of cases specific instances of which I herewith append, these consignments have been subject to pilfering before reaching their destination. In some cases the consignees have refused to accept the goods. In others they have been accepted and complaint has been filed with me.

"I take the liberty of bringing this matter before the Board in order that, if possible, some plan may be devised in connection with the adjustment of the Express enquiry that will result in this unfortunate condition being, if not entirely abated, at least very considerable minimized.

"I have the honor to be, sir."

I had the following letter in reply to that communication:

"My Dear Sir,—I have gone over the copies of letters you enclosed to me with much interest. I have, ever since this matter of pilfering and rough-handling was first ventilated before the Board, felt the seriousness of it from the public point of view. That something should be done needs no argument, but the question is what? The difficult is brought about by careless and dishonest employees, in whose hands the Express Companies are compelled to entrust their business. The Company should not be unfairly dealt with, because of the occasional wrong-doing of its employees. It is liable for loss sustained through this pilfering or rough-handling. The proper place for the shipper to establish his claim and make recovery is in the Division Court. What other system could be established to take the place of this? The Act, as it now

stands, gives the Railway Commission no authority to deal with these claims or to say within what time Express Companies should make settlements, or as to whether they should make settlements at all or not. If any change is made, it will have to be made by Parliament.

"I hope that in the course of another month the conclusions reached with reference to the Express Enquiry will be in a position to be made public."

Now, Mr. President, in connection with that matter I addressed a letter in the same tenor to Mr. Bryce, General Superintendent of the Canadian Express Company, and also enclosed to him a number of communications bearing upon this point, and I must say up to the present time, while I have received several letters from Mr. Bryce, the General Superintendent of the Canadian Express, these letters are extremely unsatisfactory in their tenor and offer no sort of relief to the shipper in that respect. Now, with your permission I will read a few extracts from some of the letters I have received during the past six weeks bearing upon this point, and showing this is a matter of the very greatest importance. Here is a letter from my accountant:

"This evening at 6.30 o'clock (twelve hours late) I received 27 baskets grapes, 3 of the lot in very bad order; 1 basket being ½ empty; about 1-3 of the balance are badly shook up.

"I have put in a claim to the Express Company for the damage and shortage of the 3 baskets received in bad order. You can put in a claim for the three baskets that are short delivered. I understand you shipped 30 baskets. This shipment was carried past Kingston this morning and returned this evening.

Here is a letter from a gentleman of Port Dalhousie, who has made some shipments. He says, in a shipment made to Mariposa on September 29th of 10 baskets peaches and 10 baskets grapes, the covering of all the peaches had been removed and fruit taken out, and one basket of grapes had but one bunch left:

"On September 13th I sent a basket of mixed fruit per Canadian Express to Brighton. This package was well packed and covered, and the lady wrote me that the covers were torn and part of the paper removed and top layer of fruit all removed.

Here is another letter:

"Your letter came last night. The peaches came on Monday night, but they did not let me know anything about it till yesterday. I found them with the baskets all broken, the handles broken off, and all had been opened and a lot of the fruit taken out. The peaches were jammed up as though something heavy had been put on them, or else they had been piled up into a corner and heavy things laid upon them."

Here is a letter from the manager of the Humberstone Club:

"The five crates of melons received this morning must have been handled very roughly, as they were well packed, but when I got them here they were in a very bad condition. There were seven of them knocked to pieces.

Here is a letter from Winona:

"Received three baskets of grapes, which I ordered. I find an unreceipted bill enclosed, etc. The grapes had been pilfered. The cover of the Delaware basket was broken and a lot taken out. The Red Rogers had also been robbed. The weight was 3 pounds less than the quantity billed."

Then here is a letter from Montreal:

"At 10.30 this morning the peaches came and fortunately I was in at the time. Both baskets had been tampered with, being about two-thirds full. There was 35 cents to pay, but I refused to take them. Please see Mr. Bunting and show him this letter, so that he may take the matter up immediately with the Express Company."

Then here is a letter from Walkerton:

"Please find enclosed the sum of six dollars, for which please send six baskets of Crawford peaches. Saw your ad in the Toronto *World*. Please when sending do them up, so as the baggage men cannot help themselves, as quite often the fruit comes baskets half empty. Trusting to hear from you in the near future."

Then here is the other side of the story:

"I wish to thank you for the splendid fruit you sent to Mrs. Cook for me. It was so well packed that it arrived in excellent condition. Enclosed please find cheque to cover the same."

Then here is another:

"I enclose P.O. order for five dollars and fifty cents, the amount which I owe you for fruit purchased from you. I only got the cash a few days ago or I would have sent it before. The fruit reached me in good condition and was satisfactory in every respect."

I just read those letters to show that an effort has been made to do the packing carefully. Then I have an extract from a letter of Mr. Bryce's which I wish to read, and then a letter from a gentleman, an eye-witness of some of the handling. Here is an extract from the letter of Mr. Bryce, dated the 26th October:

"As you are aware, we have had this matter up before the Railway Commission, and if at any time you would like to travel in our fruit train, say to Toronto, or take it right through to Montreal, to see how we handle the fruit, I would be only too pleased for you to do so, and I feel convinced it would demonstrate to you the careful way in which this fruit is handled, and also the way in which the fruit settles in the basket, and so you may have a personal knowledge as to what the Express Companies are doing to get the fruit to its destination in good order."

Mr. Bryce makes the charge that the fruit is thrown into baskets:

"As regards the packing; well, I have been too long in the business not to know about that. It is quite obvious to see when fruit has been thrown into the baskets, for the result is, as previously stated, that the fruit settles in the basket."

Now, I have a letter from a gentleman who is one of our most careful packers and shippers, and a gentleman who is conservative in his views, and who handles his stuff with the greatest care:

"Dear Sir,—Although not often at the station at express time, on Wednesday, September 14th, I was at the Welland Station when the one o'clock fruit express was being loaded, and noticed that some of the fruit was handled in an extremely rough way. Baskets were sometimes thrown 2 or 3 feet, landing with a thud on the floor of the car. I also saw baskets thrown on top of each other, the upper basket tilting at such an angle as threatened to throw the contents out through the leno of the cover.

"Since at home we handle these soft fruits with the utmost care to prevent bruising, and since the success of our business depends on the fruit reaching the consumer in good condition, it is shameful to have it so carelessly handled. It would seem, too, that it were in the interest of the Express Company that their service should give satisfaction both to the shipper and the consumer."

I have read these extracts, not that they are anything new, I presume, to a great many of the gentlemen here present who are engaged in the shipment of fruit, but simply to refresh their minds as to the instances that have occurred in their own personal experience and are occurring every day, and to present the matter to the Association for a little discussion on this question, in order that some method or some plan of procedure may be adopted that may, if not entirely do away with this unfortunate state of affairs, at least minimize it to a very great extent. I

leave the matter, Mr. President, with the meeting. If I can answer any questions in connection with it I shall only be too pleased to do so, and I now ask for suggestions and for assistance from the rank and file of the Fruit Growers Association.

THE PRESIDENT: I think this should be thoroughly discussed at this meeting. It is an important subject, and I may say I am one of the sympathizers, as I have suffered in the same way. I sent a shipment to Morrisburg and I took extra pains in having it doubly covered, and I received a letter saying that the top layer of the peaches had been removed. I think this matter should be taken up and thoroughly gone into by this meeting.

MR. AUGUSTINE: I might speak as an eye witness of the way peaches are handled. Coming up from London Fair, I got off at Glencoe, where there are a great many peaches shipped. I saw them piled up in the express car probably six feet high, and if the engine stopped or started very suddenly, I suppose two or three hundred baskets all went down, and I saw the express agent just take his foot and shove them back in one corner. I suppose twenty or thirty baskets were just pushed away back into the corner, and the rest were thrown about just like you throw sacks.

MR. DICKIE: It appears to me whatever action is taken it should be brought very forcibly to the attention of the Express Company. I was shipping a quantity of strawberries a year ago, and I saw the express messenger on the train take them and upset them in the car. I was somewhat enraged about the matter, and I wrote down to them and I got a letter saying they would give it their earnest consideration, but I never heard of it again. This summer I had occasion to ship half a dozen baskets of pears to my father, living in Muskoka, and I got a letter back saying when they arrived there they had been broken open, and they emptied the six baskets into three and a half.

MR. PATTISON: I have been connected with the paper which has taken this question up and argued it very strongly before the public in the interests of the Fruit Growers, as against the Express Companies, so strongly that we received a lawyer's letter to say if we didn't stop that things would be made very unpleasant for us. To that we replied that we intended to hew on in the same old direction, and if they wanted to make it unpleasant, why, let them come on with their unpleasantness, because we considered that it was of most vital importance to every man shipping fruit by express to-day. I am not going to go into the question of complaints. Mr. Bunting has given you ample evidence, and every fruit grower who ships by express could supply you with a lot more. The question is, What are we going to do about it? It seems, reading this letter of Judge Mabee's to Mr. Bunting, that the Railway Commission do not feel that they have power to make any ruling at present, and they suggest our remedy is in the Division Courts. I would throw it out as a suggestion that this Fruit Growers' Association take it up as an Association and appoint a committee, or appoint some of the members, to get up some cases, or a case, and push it home. Let them send out detectives or collect in some way the particulars of the grievances of the growers, and have a test case made, and have it pushed right home and these employees fined or sentenced to imprisonment. That stealing and pilfering is very common I know exceedingly well from my own experience, but there is another thing that is almost worse, and that is, when just complaints of injury to fruit go in, there is unusual delay. The express companies, I may say more particularly the Canadian Express Company, admit that these growers have cause for complaint, and still continue to put off adjusting the complaint with letters, and they drag it out so long that finally the grower becomes disgusted, and gives the whole matter up.

I think, perhaps, there are two other points where good could be done. One is that it should be widely advertised in the papers that customers, both private and otherwise, who receive these fruits are not compelled to receive them at all, and that they should refuse them at once and send in a complaint. At present there are a number of people, especially private customers such as Mr. Bunting refers to, who think they have no redress, and are obliged to receive the fruit in whatever condition it comes. The proper thing to do is to refuse the fruit and send it right back to the railway company and lodge a complaint, and communicate with the parties who have sent it, and demand redress.

I may add that I was deputed by a leading medical man of Hamilton this year to purchase some peaches for him to send to his mother, who lives in a small town in the north. I bought him the finest peaches that could be got, packed and shipped them myself, and in three days he got a letter saying that what was left of the peaches were very fine, but although there were four baskets arrived, there were only two baskets of fruit in them. I took the matter up with the Dominion Express Company, and I got this doctor to do the same, and through the agent, Mr. Dobson, of Hamilton, I am glad to say we got prompt restitution. The full damages were returned to those people. Now, that is the way an express company should do, but it also should go further than that. It should send out detectives, or have its system so managed that there would be no need of constant complaints. There is no doubt, although the evidence is absolutely overwhelming, that the express companies, and more particularly the Canadian Express Company, have pooh-poohed all these complaints, and have said that the packers were the people who were doing the pilfering, and any way, what did it matter if there was a little fruit taken away. Now, there are a great many, city people particularly, who think that the fruit grower is a sort of universal philanthropist, and if a little fruit is taken it makes no difference; whereas, if you go to a lawyer and ask them for a little law you will have to pay a mighty fine price for it, or if you go to a doctor and ask him to give away a few of his pills, no matter how poor they may be, you will have to pay for them. I think that a committee should be at once appointed and that some test case should be taken up and let the offenders be fined, and that the fact should be advertised that the fruit may be refused when it is in a damaged state and damages demanded.

Mr. A. E. Sherrington: This is an important matter. There is another question and that is the question of the delivery by the Express Company in the cities and towns to which the shipments are made. We find in nearly all the towns, and more especially the cities, that we are charged with a certain amount for the delivery of the fruit. I believe the Express Companies ought to deliver to everybody within the corporation, no matter what size the city or town is, and it should be delivered free. I think we ought to urge this upon the Railway Commission and ask them to order all the Express Companies to make free delivery of fruit within the city limits, irrespective of the size of the city or town. I ship a great deal of fruit to the City of Toronto and I am charged pretty heavy rates for delivering, and we pay them a pretty heavy rate for carrying the fruit. It should be delivered in the city free, the same as in the smaller towns.

Mr. Bunting: I think Mr. Sherrington is in error. I think there is free delivery.

A. W. Smith: In many parts of Toronto it costs more for delivery of the goods after they arrive at the express office than it does to send them to the express office. It is a very serious matter. I pay 25 cents for express, and 40 cents for delivery after it arrives.

MR. SHERRINGTON: I have never made a shipment to Toronto but I have had to pay delivery.

MR. SMITH: In the City of Toronto they do not deliver past the Dundas Street bridges. They deliver within a certain limit, but they do not deliver to other parts of the city, and you have to pay extra.

MR. SHERRINGTON: They do not make free delivery to the wholesale houses, only across Front Street..

MR. BUNTING: There is just one point I wish to refer to before the discussion closes, and that is the matter of bringing cases of this kind into the Division Courts for settlement. It seems to me that the Canadian Express Company has been referred to this afternoon as being the greatest offender in this respect. I may say I do business almost entirely through the Canadian Express Company for the reason that the Dominion Express Company does not extend from St. Catharines to a number of points. I have heard that the Dominion Express Company has been, as Mr. Pattison has stated, very much more amenable to making amends when difficulties of this kind arise, but I have at the present time some eight or ten claims ranging from one to five or six dollars against the Canadian Express Company. These claims have been filed some six weeks, some two months, and up to the present time I have heard nothing definite from them whatever. They are in process of investigation, or have probably been pigeon-holed. A gentleman here suggests they have been put in cold storage. However, you can easily understand that it means I have to bring parties from all parts of the Dominion of Canada, you might say, to endeavor to prove claims of this kind, when the Company itself has records and knew before I did that there was something wrong with these very shipments and knew the particulars from the time the shipment left the shipping point till it reached the consignee. I would like to ask any gentleman here who has been in the habit of shipping fruit if in his recollection at any time an Express Company's agent has come to him and stated such and such a shipment he made at such a time to such a party was in bad order, and they were anxious to make a settlement. Does any gentleman know of any such thing occurring in the Province of Ontario? In my experience of 30 years I have not heard of such a thing. Now, the companies have the records and they know the circumstances from start to finish, and without any claim on the part of the shipper, without any effort or process on his part these claims should be settled, and settled promptly, and an effort made to obviate a recurrence of the same from time to time. It disorganizes a man's business and it prevents giving satisfaction to his customers. I think that is the important part of it, it is a clog on the wheels of progress and the future prosperity of the fruit growers of this Province.

MR. MCNEILL: What form would you like the resolution to take?

MR. BUNTING: It strikes me a strong resolution going direct to the Express Company should have a beneficial effect. Mr. Mabee, the Chairman of the Railway Commission, has expressed his inability to undertake to remedy this matter, and you can see the force of his argument. I do not think we could ask Parliament to deal with a matter of this kind very well. I think it is a matter between our Association and the companies themselves.

MR. AUGUSTINE: Mr. Bunting made the statement that the rates were satisfactory. Are the rates satisfactory as far as express charges are concerned, because I was going to say we could not all say that.

MR. BUNTING: No, the freight rates in carload lots.

MR. AUGUSTINE: In large fruit growing centres they have a decided advantage over an isolated fruit grower who is perhaps the only one who is growing

small fruit. He has to pay in some cases nearly twice the rate to a certain point as they have to pay from the Niagara Peninsula. I do not think that is fair. They have to run the express cars anyway and they have the messenger there and it does not cost them any more. I do not see any good reason why we should not have the same rate.

MR. BUNTING: I said there had been an effort to have the frieght rate re-adjusted, and as far as I am aware, with one or two exceptions, from the large shipping centres the freight rate at the present time, more particularly in car-load lots is not very unsatisfactory. There are some exceptions to that. However, as far as the express rates are concerned that matter was brought before the Railway Commission a year ago last January in Toronto, and as Mr. Mabee has stated in his letter to me the expression of the Railway Commission's judgment on the matter is to be issued inside of this coming month. The committee appointed by this Association made a presentation to the Railway Commission suggesting a schedule of rates and if those rates are adopted and accepted I think the Association will feel that the Committee has done its duty in that respect.

MR. THOMPSON: There are quite a few exceptions. There are places where the freight rates are very exorbitant and it has got to be a serious matter when you have to pay $300 per car instead of $160.

MR. BUNTING: I think Mr. Thompson refers to rates to the far West. I think I mentioned they were not satisfactory, but other points have been rectified.

THE PRESIDENT: Mr. Bunting, you have this matter far better in hand than anybody else here and I would like to ask whether you would suggest whether or not this should be referred to the Resolution Committee?

MR. BUNTING: My chief object in bringing the matter before the meeting to-day was that a large representative meeting like this, a representative opinion, would back up whatever committee might be appointed for the coming year, and enable them to feel they have the support and co-operation of every grower in the Province of Ontario, which I take for granted they have. I think an expression of opinion from this Association would very much strengthen the hands of the committee at the present time.

MR. AUGUSTINE: There is one other matter I would like to mention. It was suggested some time during this meeting to bring in a resolution, or to bring up the matter anyway, that the inspection in regard to the Fruit Market Act be made to cover the open package as well as the closed. There is a great injury being done at the present time by shipping in open baskets. I don't mean the baskets, but the barrels that are being shipped to the North-West during this last fall. They are simply trash, and the difficulty is you might say that is nobody else's business if somebody has a mind to buy those apples that way. But the question is that the people who are consuming those apples are paying prices that they ought to get good ones for, and if people operate in that way there is no chance for a person who is trying to do a legitimate business and who complies with the law. I do not know whether it comes properly into this business that we are discussing now or not, but I would like to get an expression of opinion on that, as to whether we should include the open package in the inspection as well as the closed. We go into competition with British Columbia, and if we are going to allow people to send that stamp of apples to consumers in the North-West, no wonder we hear the cry of poor fruit that is being sent from Ontario.

MR. MCNEILL: The open packages are subject to the Fruit Market Act, to this extent, that the open face must agree with the rest of the package all the way through, and the Inspector inspects it to that extent. Mr. Augustine is com-

plaining really of a real grievance in as much as there has been a great deal of poor fruit sent away to the North-West in those open barrels, but there is no way of getting at that except by opening up a new principle which I do not think the majority of fruit growers would agree to. A man can ship anything he pleases provided there is no fraud in the matter. There is no fraud in these open packages if the top is the same as the bottom, and you can see what you are buying. I am told that Mr. Vair, of Barrie, undertook to put a linen cover over these barrels and still call it an open package. Mr. Augustine will be pleased to know that we laid an information against Mr. Vair, and a telegram from Winnipeg announces that yesterday Mr. Vair was fined. And Mr. Vair, if he continues in the practice, will be increasingly fined, until I think a $100 fine will convince him that shipping in these barrels with linen covers, which is just to get over the law, will not pay.

Mr. Bunting: I had a case in point a few days ago. I happened to see a car of cider apples, and I also saw another car loaded with basket apples, and I thought a good many of those basket apples ought to have been put in the cider car. However, I was curious enough to follow up those apples, and I enquired from the wholesale man what he was getting for them, and he said he was getting 20 cents a basket. I do not think there is very much profit to a shipper at 20 cents a basket, and I thought he would not care to keep on doing it. As a matter of fact there is a class of people that would like to get a cheaper grade of fruit, and I do not think we can say that a man shall not ship poor fruit, as long as it is shipped on its merits.

Mr. Jones (Maitland): When the question of these open packages was up some of the people in Quebec Province spoke very strongly on the matter, because they said most of the fruit growers in the vicinity of Montreal shipped an immense amount of fruit into the market at Montreal in open packages, and that was a trade that they had to fill, and it was a trade the city looked for and expected and there were purchasers of that kind of fruit. When the discussion took place with regard to the Act this question was taken up and it was decided to have the Act read in such a way that open packages can go into any market provided the face of the package represents the contents as regards grade. It simply protects those who want to do that kind of a trade.

IS THE PRESENT ACTIVITY IN THE EXTENSION OF ORCHARDS LIABLE TO BE OVERDONE?

Robert Thompson, St. Catharines.

To answer this inquiry briefly, I do not think it is likely to be overdone at the present time. Outside of a few lines I do not think we are planting enough to keep pace with our market. It is true sometimes on account of not being able to market our fruit, and not knowing what markets would be open for it, we have had to take a low price, but knowing the high and excessive prices we have got for our fruit this year it seems to me there is an opening for a lot more planting than is being done. The southern part of Ontario is an apple-growing section, and there are going to be more apples planted this spring than has been planted in the last ten years. In other portions of the Province they are going back. However, with the openings and the possibilities of the markets of our Dominion I think we can

market one hundred times as many apples as we are doing at the present time. I was amazed when the apple buyer was speaking in the early part of the meeting about what they were doing and the way the philanthropists were giving us so much money. I remember the time they came very early in the season and offered us big prices. I have in mind a man that sold his orchard for $500 and they took out over 1,000 barrels. At present prices you can figure out who is the philanthropist.

Mr. Case was speaking to you about the low-headed apple trees. I saw some people shaking their heads. If they could have gone back no longer than four years you would have seen the same thing happen when we talked about low-headed peach trees. To-day we have got them down and I have seen the men selecting fruit within a foot of the ground which is as good as at the top of the tree. As far as the apple trees are concerned there are orchards being set out with the idea of growing them and handling them the same as our peaches, and I agree with that from what I have seen during the last few years, that we can get apples in paying quantities in a very short time. Of course some years we may have to take lower prices. Take peaches, for instance. We may have to take a lower price than we have been taking for the last few years, but that will only help to extend our markets. Our own increase in population, with the railway extensions, and better transportation for handling the fruit will mean that much more fruit will be required, and I think our markets will double every year and we will be able possibly to sell our fruit for less than we are doing at the present time and make more money. I remember when grapes were sold at 4 cents a pound and people had to go out of the business, and now they are selling them for a good deal less.

Mr. Jones: In speaking from the standpoint of the part of the Province in which I live, I may say I do not see any danger at all with regard to over-planting of orchards. With the exception of the result of some good work that A. D. Campbell has done in the County of Dundas, there is practically no planting being done. In Leeds and Grenville, where I live, they are so wedded to the cow's tail they cannot get away from it, and the consequence is the orchards there at the present time are being seriously neglected. I think the owners forget they have such a thing, and the consequence is the fruit is being neglected, with very few exceptions indeed. The fruit this year was almost *nil*. There is practically no planting being done. Agents come through there and say they cannot do any business. It is a matter of sentiment, I think, in some localities. Now, I think what sentiment and enthusiasm we have in connection with one of the best paying branches of the farming industry should be encouraged to its fullest extent. Our markets are extending in every direction. A few years ago when we took such low prices for our fruit there were practically no markets in the North-West. It was the land of the Hudson Bay Company for getting furs, but to-day we have a large consuming population there and they cannot grow fruit. They are looking towards British Columbia to supply the Western Provinces, but this year even though they say they have large crops of first-class fruit, more Ontario fruit has been sold than ever. They are not able to supply the demand, and I do not think British Columbia will ever supply the demand in the North-West Provinces. We are getting better transportation across the ocean to the European markets, and the orchards are not increasing in Europe in acreage to any extent. The population of our own towns and cities is increasing to a greater extent year by year than our rural population, and I feel we have very bright prospects for a continued profitable

market for our fruit. I cannot see that there is the least danger of over-production. I may be wrong, but I think I am right.

MR. WALLBRIDGE: How do you account for more Ontario apples being sold in Winnipeg?

MR. JONES: I think there were two reasons. One reason was our packing this year. The fruit has gone into the Winnipeg market, in better shape than it has ever gone before, and the other reason was, I think, that British Columbia, with all the noise they make with regard to their immense crop of fruit, did not have the fruit to put there. It was recognized this year that our fruit was very superior, in packing, to what it had been previously.

MR. WALLBRIDGE: How did the prices compare?

MR. JONES: I do not know how the British Columbia fruit sold, but the prices from the West this year to the Ontario growers were very satisfactory. In one case I sold one carload of fruit, and it was practically the run of the orchards, graded into firsts and seconds and thirds, and shipped out to points west of Winnipeg, at $3.25 a barrel, and on that car the purchaser paid $293 freight, so that the apples cost him something by the time he got them.

MR. SHERRINGTON: I do not think that we should have any fear of the over-production of fruit in this country. Where there are a thousand trees being planted to-day there are nearly that many dying or becoming unproductive. What is the use of all our work, and attending all these conventions, and all this money that is expended, if we throw cold water on the prospects of the fruit industry of the Province of Ontario and try to frighten the growers by saying we will have over-production and we will have to take lower prices. Now, even if we do have to take a little lower price, I for one think I can live on a little less than 10 per cent. on a basis of $1,000 per acre of orchard. I have been making myself this year 17 per cent on a basis of $1,000 per acre, and on the basis of $200 a year which the land cost me six months ago—it was not all in apples—88 per cent. I am making some money, but I can live on less than that, and I am quite willing to take a little lower price. What we want, I think, is greater activity in planting out, and greater activity in the production of a higher class of fruit. We have a large percentage of a low grade of fruit and what we want is a larger percentage of a higher grade of fruit, and let the prices take care of themselves. I think it is a mistake to throw out any hint or suggestion in any way that we are going to have any over-production of fruit in Ontario, for the simple reason that the markets are widening. In our Canadian North-West there is a greater consumption, and over the whole continent of Europe there is an increasing demand, as I understand it. In the United States in a few years they will have no apples to export. They are buyers at the present time, and they will pay any price for our Canadian Northern Spies. And not only that, but there is greater consumption right here at home. I think if they were all as great consumers of apples as I am they would need to plant out new orchards pretty fast, for it takes half a dozen to a dozen apples to do me a day, and I would like to say right here that people cannot eat too many apples, and therefore I have no fear as a grower of over-production of fruit of any class.

MR. MITCHELL (Clarksburg): I do not think we need fear very much for the next few years at any rate, and perhaps in our life time. As the last speaker said, I think it is going to fall into the hands of specialists who will grow a high class of fruit. We have enquiries from Sweden, Norway, Belgium and South Africa, to say nothing about our North-West, and if we had 100,000 barrels of apples this year we could sell them. I think if we go to work and plant good

varieties of high-class apples and take good care of them there will be no fear of over-production.

MR. CASE: That is a bugaboo about the over-production of apples. I remember I set out my first apple orchard in 1882. I had an uncle who lived on a farm adjoining me from the fall of 1827, and he was a very thorough man, the man by the way that started me out in farming. He knew such a thing was so but he couldn't tell why, and now our friends, the scientific men come and tell us why such things are so. I had this orchard set out with the trees 40 feet apart each way for the apples and 20 feet apart for the peaches, and blackcaps set in between, three rows to a row of peaches. I think that figures 3 feet and six inches. I got them all set and growing. I had been in the habit for a number of years of taking this uncle around as I wanted his criticism. We would walk over the farm as long as he was able to walk, and when he couldn't walk I would get a horse and we would drive over everything and through everything for the sake of having him see it. He was a man that everything he said came right from the shoulder. There wasn't any palaver about him at all. As we were going through this orchard I said, "Uncle James, what do you think about it? Do you think we are setting too many apple trees?" He says, "I don't know, I can best illustrate that by telling a story. I moved on to that farm in 1827, and where that apple orchard sets down in there was all grown up with blackberries, and I went at it and cleaned it up, and in 1833 I set it with an apple orchard, two acres and a half of trees. Uncle Elihu Granger came down to visit me and I showed him the apple orchard. The trees were set right and were growing nicely, and he says, 'Boy, you are making a mistake setting all those apples out. What are you going to do with them when the apple trees grow out? You can't grow anything there. See what land that is for wheat and corn and barley, and what are you going to do with your apples? When apples are high you can't get but 25 cents a bushel, and when they are cheap you can't get that. So' he says, 'you had better tear them out.'" Well, Uncle James said he didn't want to tear them out, and he grafted them with a lot of sweet apples, because he knew he could feed them to the cattle and hogs in the winter, and when he built his house he looked out for a good cellar where he could keep them. "Now," said my uncle, "all these years have gone by—that was in 1882, and that orchard was set in 1833—and I haven't got any figures to prove it, but I thoroughly believe that that two and a half acres of apple orchard has made me more clear money than all the rest of the two-hundred acre farm put together. I have sold apples out of that orchard for five shillings a barrel, and that means 62½ cents, and I have sold apples out of that orchard for $5 a barrel. Now," he said, "you go on and take care of your apples. With all the hundreds of thousands of apple orchards that have been set out since that time, with the increased transportation facilities so that you can distribute them so much farther, you can get rid of them, and then the best thing of all, we are just commencing our evaporating. There is the best thing of all for," he said, "you can ship them to the ends of the earth, and you can carry them over from one year to another. Take care of the apple orchard." Now, that is a good while ago. It is pretty near thirty years ago. I have a sister in Rochester, who has brought up seven boys. Her husband was in the lumber business and six of those boys are now in the lumber business in Rochester. They have been very successful and are worth a lot of money. The seventh boy is a banker. My sister came down last spring, I think it was, and it was the first time in several years that she had really appreciated what I had done with that old farm of father's. I was showing all I had

done with it in getting the stones off and under draining it, and I think it was the first time she appreciated it. She stayed there a day or two, and one day she said, "Bryan, Fred (that is the teller in the bank) thinks you are making an awful mistake." I said, "How is that?" "Well, he says there isn't any question but what you have made a great success in growing fruit and marketing it, but he says you are ready to tell anybody anything they want to know about growing fruit or selling it or anything else. Now, he says that the men that he knows, if they have studied something and get a good idea they don't tell anybody about it; he says philanthropy doesn't pay, and you ought to keep those things to yourself and not tell everybody how to grow these apples and take them to market." I said, "Look here; there is more in life than the actual money you pile up (hear hear), and perhaps to live so that when I come to drop out in the section that I live in and the people who knew me can say, and say truthfully, that the section I lived in was better for my having lived in it, is better. (Hear, hear.) But now the apple business is very different from the lumber business," I said. "Your boys sell a bill of lumber for a house, and when that house is built there is no more lumber wanted for that house, and you have got to hunt up another house before you can sell any more lumber; but with the apple business it is entirely different. I don't care how many apples you grow in Western New York or how many you grow in Canada, there will always be a market for them. It is the poor apples that make the trouble." I said to her that one barrel of poor apples on the market will hurt that market more than ten barrels of good ones. (Hear, hear.) She couldn't see it at all. "Well now," I said, "I will take it right home to you. You go in the morning to buy your day's supply for your family, and you go into a grocery store and they have got a barrel of poor apples there, and they are cheap, and you think you will buy a peck of apples for your boys, and you buy them and take them home and put them on the table in the evening and the boys taste the apples and perhaps they eat one and perhaps they don't, and the next morning you still have your apples. Well, you put them into pots or make them into sauce to save them. You go down to the market the next morning to buy your supplies and you say to yourself, 'my boys don't like apples, I guess I won't buy any this morning, part of that peck is there yet.' Now, if there is a nice barrel of apples there you look at them and the price is pretty high, but you say, 'I guess I will try it,' and you take a peck home to your boys, and you bring them and put them on the table after supper, and the boys take an apple and say, 'That's a good one, I guess I will have another,' and the next morning you say, 'Where are my apples?' 'Why,' they say, 'they were so good we finished them.' Now, when you go down to the market the next morning you are certainly going to buy some more of those apples for your boys, and you will buy peck after peck right straight along. Now, if we produce good apples there is a place for every apple we can produce, and you will make a profit out of them."

It seems to me the future of apple growing never looked so bright as it does to-day. I agree with the gentleman that spoke before me here when he said we are getting too much money for our apples. We have no business to have so much; we are getting more than our share when we can get ten per cent. or fifteen per cent. on a valuation of that kind, but at the same time, as a grower, I am going to get all I can. (Applause.)

Mr. Johnston (Forest): I think I can only repeat what has been said by some of the gentlemen who have spoken. If we travel through the length and breadth of this Province we will find orchards that were planted with the hope of being a profitable source of revenue neglected and left to fall a prey to oyster

shell or San Jose scale or Codling worm, or something else. I don't believe there are as many apples grown in the Province of Ontario to-day as there were five or six or even ten years ago, but in the County of Lambton we have confidence in the fruit industry as we are going into the planting most extensively. Right around the town of Forest I know at the present time there are fifty thousand trees ordered for the coming spring, and it is estimated that from one hundred thousand to two hundred thousand trees will be planted in the county next year. I think this is proof that we believe in the prospects of the fruit growing industry. We are also growing peaches up in the County of Lambton. We are planting peaches most extensively. A few years ago people imagined there was no place peaches could be grown but in the Niagara District. They thought down there they were in the banana belt and nobody could grow peaches but themselves, but let me tell you we have also a banana belt in exactly the same latitude, and we have some fifty thousand acres of land just as productive, and the result is people are going into peach growing very extensively. Many years ago people there were growing peaches and growing splendid fruit, but growing in a small way, and when the peach leaf curl appeared upon the scene and not knowing how to overcome it they gave it up. However, now the new peach orchards are coming in, and I think in perhaps four or five years we will come up to Niagara. We think we have a district which, without detracting from the Niagara District, will rival even that famous locality.

MR MCNEILL: There is not the slightest ground whatever for any pessimism in the matter of fruit growing. I have gone very thoroughly into the matter, particularly with respect to apples, and I have this to say, with intelligent marketing we could market a hundred times as many apples as we are growing to-day. There is not the slightest reason why we should not capture the English market completely in the early as well as the later species. Then there is a splendid market opening up in Germany, and the rest of Europe is looking for apples and we can get in there. Then there was a fair quantity sent to Sweden last year, and also to South America, and then our neighbors to the south of us will be willing to interchange their earlier with our later ones, if we let them. There is nothing but the brightest outlook for the fruit growers. Now there is a "but" to it. But the day of the careless, shiftless fruit grower is gone. The fellow who will not spray and will not look after his fruit is not going to get along. Fruit growing in the light of modern science is a different proposition to what it was formerly. We see in different parts of the Province the orchards being neglected which used to produce an abundance of fruit. I look down in the County of Norfolk where there were thirty thousand barrels of apples sent down this year, and I am perfectly certain that the same trees would not have produced three thousand barrels of apples if it had not been for the efforts of this Association. Now, the battle is going to be with the up-to-date fruit grower, and the up-to-date fruit grower hasn't the slightest ground for fear. I can hardly express to you my appreciation of the markets that are opening up for the fruit grower, and I would just say there isn't the slightest difficulty about that.

MR. WALLBRIDGE: You spoke about the people of the United States being willing to interchange their earlier apples for our late apples. They grow late apples.

MR. MCNEILL: We can grow, and I will say it in the presence of our friend from New York, in many districts twenty-five cents a barrel cheaper than they can. They have to add the price of cold storage facilities to their winter apples, and when they are doing business at no profit we have a profit of twenty-five cents a

barrel, so you can see our winter apples are not likely to be soon run out of the market. I don't think they will run us out of the markt with their early apples either, because I have just enough confidence in the bull headedness of the people that we will never have reciprocity, and we will have protection whether we want it or not.

Mr. Robertson: I may say, following what Mr. Johnston has said, that we have been growing peaches for quite a few years down in the Niagara District. Towards the end of the nineties we used to get abundant crops, and I remember in 1897 I had some thousands of baskets and low prices. Then the next year was cold and damp and the leaf curl took the leaves off the trees, and the fruit that was set dropped off, and we had a short crop and high prices. With the advent of the low prices it didn't pay, and the setting out of peach trees practically stopped. The result is the prices this last few years have gone abnormally high. Now, what do we find. Young fellows are coming in, and many of them, I am sorry to say, never will be fruit growers, and they are subdividing their farms into five-acre lots and they are setting them all out in peaches. We find those trees that are coming into bearing are affected in some parts with peach yellows. Now the law is if we get the signature of twenty-five growers we can ask the County Council or the Township Council to employ an inspector, but who is employed? A fellow fruit grower who has more than he can do already, and it doesn't amount to very much. We can tear out our peaches when we see they are affected with the yellows, but there is only a rail fence betwen us and our next neighbor, or a wire fence, and he says "I will mark them," and there they are sometimes in the spring, and not only that tree but the four or five next to them are as badly infested, and that kind of thing is spreading the peach yellows. I think the present activity along this line is certainly going to be overdone.

I think it is time for our Ontario Fruit Growers' Association to ask the Department of Agriculture to appoint inspectors in the peach sections especially, to go around and inspect our trees like they do in New York State. If they appoint an inspector they see that he does his work, and they give him power to enforce the law. I think it would be in place as Ontario Fruit Growers to ask them to take it into their consideration at least.

Mr. Case: Professor Whetzell has proven in an experimental way what I have proven in a practical way in regard to the apple fungus. Professor Whetzell has proven that the spores of the apple fungus are carried over the winter on the leaves on the ground. It was a great surprise to us. We supposed it was carried over on the trees. All it requires is for warmth to be applied and the rain to come and the spores will swell up and burst, and when it bursts it shoots its summer spores right into the air. Now, we have all heard for years and believed it that if we had a lot of wet weather during the blooming period, and the bloom didn't set and the apples dropped off, it was due to a lack of fertilization. I don't believe it to-day. It is because of the wet weather all right, but not from lack of fertilization. Now, if you look you will see those fine pistils stand right in the centre of the stamens; they stand right around it with the blossom leaves on it, outside it. I claim you only want two or three or four hours of fairly bright weather with quite a little breeze blowing to blow those blossoms across that to do the work—you only want one in twenty fertilized—but, according to Professor Whetzell the cause has been that the spores of the fungus has got around that delicate stem, and what we have been blaming to a lack of fertilization is due to the choking of that delicate stem with the roots of the fungus. That is what Professor Whetzell

has proved in an experimental way and a scientific way. This year we tried to overcome that. Now, as the bud commences to grow, if we spray before they open out we have bad dropping of the fruit, but we found if we caught them after they had opened out so that the spray could be driven in there so as to cover all those stamens nearly every apple stayed, and we had to pull off hundreds and hundreds of bushels to save our trees.

MR. JOHNSTON: You sprayed just before they opened?

MR. CASE: Just before the bud opened, or even if some were open.

A MEMBER: The bud or the blossom?

MR. CASE: The blossom is open, so that you can drive the spray right in onto those blossoms. You understand there are three or four or sometimes five in a cluster.

MR. CAESAR: I do not understand with regard to your time of spraying?

MR. CASE: It is when they open up or separate. You will find there is a point when they separate before the bud really opens, or a few of them are open—just before the blossom opens.

MR. WALLBRIDGE: How long before the blossom opens?

MR. CASE: Just ahead of it. You can have a few days there to do it. The spores get into these delicate stamens, and if they don't choke it off they at once, after the apple turns over you have it on the stem. That is what Professor Whetzell claims, and a lot of us have followed his instructions this year and we have had beautiful crops of apples.

MR. THOMPSON: You don't think it is better to plow in the fall. Don't you think it would be better to turn those leaves under the ground.

MR. CASE: I took that up with the Professor, and the point is you can't get all those leaves under, and if you have two or three leaves left when they develop they will inoculate all the trees around.

MR. JOHNSTON: Do you spray before that spraying?

MR. CASE: This is the second spraying. That one ahead of the bloom we claim is the important spraying for fungus.

A MEMBER: How many days have you to do this work?

MR. CASE: You have a few days. You have to get a sufficient force to do it and do it quick. Professor Whetzell tried to kill those spores and he couldn't kill them except by burning, and you can't get every leaf.

MR. CAESAR: I agree with what Mr. Case has said with regard to this. It is a most interesting and complicated thing. There are two kinds of spores in the year. The winter spore that is formed on the old diseased leaves is a different thing from the summer spore. They are so light they go into the air very easily and they get into the lower leaves and if you watch carefully in your orchards just about the time the blossoms are out you will see the leaves beginning to turn a dirty brown color or a yellowish brown color. I can hardly describe the color. That is where the fungus has already started on those leaves just before the blossom has come out. Then in a few days that lower set of leaves to which the spore has reached is ready to send out a different kind of spore, which is carried by the wind from the lower limbs all through the tree and around through your orchard. That is the way it spreads. Then, if you want to protect your fruit what Mr. Case has said is just right, by spraying just before the blossoms come out. You cannot go to every tree and look, with all the varieties of apples, and select the ideal time. We wouldn't get through our orchard if we did that, but if you take them just as the blossoms are beginning to burst, and perhaps a few of them will be out. It wouldn't do to spray when the buds are open, but you may

have an occasional blossom out. Then if you follow that up as soon as ever the blossoms fall and cover your little fruit you will control your apple scab. Those two in most years will absolutely control your apple scab. I would differ slightly from the Professor and Mr. Case when he says the second one is the most important. There was a man here last year who sold 1,400 barrels of apples. He sprayed last year according to the ordinary method in the spring with lime and sulphur and then immediately before the blossoms burst, and then immediately after they fell. This year he left off the spraying immediately after the blossoms burst, and he wrote to me a few weeks after the apples had got about an inch in diameter, and said, "I have got some apple blight in my orchard and I don't know what it is. I wish you would come out and see it." I went out and I found that every leaf in that orchard and every apple nearly, that last year he kept so clean, was simply covered with apple scab fungus, and I believe it was due to the fact that he didn't spray just before those blossoms burst.

A MEMBER: How long will those spores retain vitality?

MR. CAESAR: A long time.

MR. ROBERTSON: May I put that in the form of a motion, to amend the present law in connection with the Fruit Inspection Act—that the Inspectors be given full power and that the power for the appointment of Inspectors be taken out of the hands of the Township Councils and placed with the Provincial Government, on condition that twenty-five ratepayers ask for the appointment of an Inspector.

MR. THOMPSON: I second that. The only change is that the Department appoint the Inspectors instead of the Township Council. With all due respect to some of the Townships, I know for a fact there are others which do not do it.

MR. WALLBRIDGE: There is the expense in connection with it. The Government in all probability would not go to the expense of appointing an Inspector for each little district. They would be willing to appoint an Inspector for a municipality if the fruit growers in the district pay the expense.

MR. THOMPSON: There is no change in regard to that. The law is on the petition of twenty-five ratepayers the Council have to appoint an Inspector, and the Government pays one half of the expense. All we ask is that the Government appoint the man instead of the Council, and that they see that a competent man is appointed. The expense is apportioned just the same.

MR. PATTISON: I think the point is well taken. I was over to the Niagara District examining into this very thing, and to my certain knowledge, just as he says, there are only two or three townships that appoint really competent men, and if the fruit growers haven't confidence that the man knows his job you can hardly blame them for refusing to take the trees out.

THE PRESIDENT: The motion that is before us is this: "That the Fruit Inspection Act as it now stands with regard to Township Inspectors be changed, and that the Inspector be appointed by the Government on the application of twenty-five members from the district so wishing this Inspector, on the same basis of expense as at present."

The President put the motion, which on a vote having been taken, was declared carried.

FIRE BLIGHT SUCCESSFULLY COMBATTED.

D. H. Jones, O. A. C., Guelph.

I presume there is no one knows so well as the fruit grower that the enemies he has to contend with in the successful production of fruit may be referred to as legion, and the method of combatting the different enemies vary according to the particular nature of the enemy. I have no doubt that many fruit growers are tired of being told that such and such an enemy requires such and such treatment and that another enemy requires a different treatment, so that at the present time we have quite a number of sprays and washes and other methods of treatment in order to keep in check and to stamp out as far as possible the enemies that prevent the successful production of fruit.

In order to successfully cope with a disease, whether it be a disease of animals or of plants, it is most desirable to know its specific cause and its methods of attack. Practically all that is known concerning the precise nature of infectious diseases both of animals and plants has been learned during the last 30 years or so. Everyone now is familiar with the precautions necessary to prevent the spread of typhoid fever, cholera, tuberculosis and anthrax, and other infectious diseases in man and animals. Individuals suffering from these diseases are isolated as far as possible, and care is taken that all discharges from their bodies are burned or otherwise disinfected. These precautions are necessary because these diseases are the result of micro-organisms gaining access to the body through water, food or wounds and there rapidly multiplying. Their multiplication produces the symptoms of the disease, and as millions of the germs are soon produced in the body from a few that have gained entrance, some of these are given off in the discharges and if these are not destroyed they are liable to spread the disease to whoever comes in contact with them.

The disease of some trees, known by the various names of fire blight, pear blight, apple twig blight, body blight, and blight canker, is a bacterial disease, and hence if its spread in our orchards is to be prevented precautions must be taken somewhat similar to those found necessary in dealing with bacterial or infectious diseases of man and animals.

So far as is known, the disease is peculiar to North America, where it has caused immense losses to pear and apple growers. In addition to being found on the cultivated and wild varieties of apple, pear and quince trees, it is quite common on the juneberry, hawthorn and mountain ash, and occasionally it is found on the plum.

The disease is caused by a microbe known as *Bacillus amylovorus*, which on gaining entrance to the bark of a tree subject to its attack, rapidly multiplies there, and in doing so kills the bark. If the bark attacked be that of a twig, the twig with its leaves, blossoms or fruit will wither, turn brown and die. If the bark attacked be that of the trunk or main limb, the result is a canker of the area attacked. The cankered area is usually darker colored than the healthy part, is somewhat sunken, and usually surrounded by a crack. If the cankered bark be cut, it will be found to be brown and tough instead of being white or light green and tender. The canker in the apple tree does not usually spread to very great dimensions except in a few varieties, principally the Russian varieties. With the pear tree, however, it is different, for when the bacillus finds entrance to the bark of the trunk or a main limb of a pear tree it usually continues to spread there until it has killed the tree outright.

For the disease to spread rapidly in a tree it is necessary that the affected bark be juicy. The bark of the large limbs and trunk of the pear tree is softer and more juicy than that of most varieties of apple trees. Hence it is that the disease spreads more rapidly and does much more damage in the trunks and large limbs of the pear than in those of the apple. On the other hand, the bark of the twigs and young shoots of the apple is softer and more juicy than that of the pear twigs, and consequently blight of the apple tree is usually in the form of twig blight, all the young growth on the tree often being killed out in one season.

Trees in sod are not so sappy as those under cultivation. Hence it is that the disease kills off trees in well-cultivated orchards more often and more rapidly than in orchards that are in sod. However, sod is not the ideal condition for an orchard. It not only curtails the production of fruit and hinders the development of the tree in general, but it harbors numerous orchard insect pests for which it is a good breeding ground. We must, then, if we are to get the best results from our orchards, cultivate them and find some other means of keeping the blight in check than by leaving them in sod.

How it is Spread.

1. Insects.—Insects, more than any other thing, are responsible for spreading the blight. It was demonstrated a few years ago that bees, wasps and other blossom-visiting insects often carry the germs of the disease on their bodies, especially their mouth parts, to the blossoms they visit in the orchard. When they insert their proboscis into the flower to get the nectar, they deposit a few germs in the nectaries, and here the germs develop rapidly, kill the flower, and pass down the bark of the flower stem to the fruit spur, kill it and all the other blossoms on it; they then continue to work their way in the bark, passing on down the twig to the larger branch, and thus we get a typical case of "twig blight."

When the disease is active in a sappy tree, there is often a gummy exudate from the part affected. This is usually amber colored, and may be seen on the outside of the diseased bark, sometimes in globules and sometimes slowly streaming down the surface. This gummy material is teeming with the disease germs, and many insects like to feed on it, and in feeding on it they get their feet and mouth parts covered with the germs, and these, when they fly away, they take along with them. So when they fly from a diseased tree to a healthy one, they are liable to inoculate the latter with the disease germs from the former. The inoculation is made either through the flower by the honey-seeker or else by a puncture of the bark by biting or boring insect such as a beetle or by a sucking insect such as the various plant bugs and aphids.

We found as a result of our observations made in the college orchard, and many orchards in the Niagara, St. Catharines and Whitby districts, that fifty per cent. of the total amount of twig blight on apple trees in 1909 was due to its spread from twig to twig, from tree to tree, and from orchard to orchard by aphids (*Aphis mali* and *Schizoneura lanigera*), and that practically all the twig inoculations that were made after the blossoming season were made by these same orchard pests.

It is well know to orchard men that the aphid's favorite feeding place is on the water sprouts, suckers and young twigs of the tree. It is here they find the tender bark which they can easily puncture to obtain the plant juice which is so plentiful there. It is the tender, juicy bark that, as we have before mentioned, supplies the ideal conditions for the blight germ to rapidly develop in. An aphid,

when feeding, punctures the bark, from which it draws the sap with its sucking tube. Should the twig which it punctures have the blight, the sucking tube which is inserted in the bark will be contaminated with the blight germ, and large numbers of germs will be drawn into the body of the insect, and will cover its mouth parts, and so when the aphid moves to another twig it will carry the germs along with it, and on puncturing the fresh twig will inoculate it with these germs. We found this to be happening in practically all the orchards we visited during June, July and early August. We found many young trees that had not yet born a blossom and that were absolutely free from blight before the aphids came in June, to have, after this date, all their young shoots killed out by the gradual spread of the disease, from the tips downward, after they had been inoculated by aphids. We also found large numbers of suckers and water sprouts on the older trees develop the disease after the aphids visited them, and rapidly die. In many cases, when the disease reached the base of the water sprout or sucker, it entered the limb or trunk on which the shoot grew, and there formed a canker, sometimes large and spreading, if the bark was juicy, and sometimes small. The bark immediately surrounding such cankers is liable to harbor the disease germs through the winter, then in the spring, when the sap begins to run once more, the germs rapidly develop, spread further through the bark, thus enlarging the canker and often girdling the limb, which results in its death.

Spread of the Disease in Nurseries.

We found aphids to be the principal means of spreading the blight in apple tree nurseries. Wherever in nurseries the aphids were kept in check there was practically no blight. While in the nurseries in which the aphid was allowed to have its way there the blight flourished in all directions.

While aphids and "twig blight" are both common on the apple, neither are very prevalent on the pear. Blight, however, kills off many more pear trees than apple trees. How, then, is the blight carried to the pear trees? It is sometimes carried to the blossoms by bees and wasps, and it is such inoculations that are responsible for most cases of "twig blight" in the pear. "Body blight," however, is more common that "twig blight" in the pear. This is the same disease working in the bark of the trunk and larger limbs. How do the germs get into this old bark? Sometimes they enter it at the base of the twigs which have been inoculated at the blossoms. We found, however, during the last two seasons cases of direct inoculation into the bark of healthy trees made by the fruit-bark-boring beetle (*Scolytus rugulosus*). This is the same beetle that works in the bark of the peach and cherry, causing them to exude large quantities of a gum-like material. The pear tree does not exude this gummy material, and as the hole made by the beetle is very small, and is usually underneath a bud or spur, it is not readily seen. This beetle bores in the bark, and is more common on weak or diseased trees than on healthy ones. We found the beetles in the bark of blighted trees to be literally covered with blight germs, and we found the disease to be developing around the fresh punctures made by these beetles in the bark of healthy trees. The fruit-bark-boring beetle, then, is one means of spreading the blight among pear trees.

2. Pruning Tools and Cultivators.—The pruning knife, saw, chisel, shears, harrows, cultivators, and other tools used in the orchard, after coming in contact with a diseased tree, are potent carriers of the disease. We have seen numerous cases of blight that could clearly be traced to this source of infection; and we proved in a number of experiments how easy it is for the disease to spread in this

way. After using a knife and a saw on the diseased part of a tree and then on a healthy tree, nitching the bark or cutting off branches, we found that in seventy-five per cent. of the experiments the healthy tree contracted the disease at the point cut.

Scraping healthy trees with diseased trees when removing the latter from the orchard is also a common method of inoculating healthy trees.

Eradication and Prevention.

When once the disease enters a tree, whether it be in the fruit, twig, branch or trunk, there is no remedy for the affected part. The only measure to be adopted is to cut out and burn it right away. To cut off an affected twig will save the branch on which it grows, and to cut off a diseased large branch will save the tree.

In cutting dead or diseased tissue from a tree, care must be taken to cut from six inches to a foot below the blighted area, as the germs always extend further than the visibly affected part. Whenever the pruning tool comes in contact with the disease in pruning operations, it should be disinfected by being wiped with a disinfectant, as corrosive sublimate—1,000 or 10 per cent. formalin. These may be carried in a glass bottle. If a wire is run through the cork, so as to project into the bottle, and a piece of rag tied around the end of the wire, this may be used as a convenient swab for applying the disinfectant.

The best time to cut out blight is the first time it is seen, as every case of active blight is a potent source of infection for innumerable other cases. However, it is not always practicable to locate every case of blight as it occurs. The best time for systematic action in an orchard is in late fall or early winter. At this time the diseased parts are more readily noticed than in late winter or early spring; and if precautions are taken to burn the material cut out, this will ensure the destruction of the beetles, aphids, and other insects harboring on and in it.

If an orchard be cleared of the blight during the winter, there will be no germs there for insects to get contaminated with in the following spring. Hence, as the bees and wasps go from flower to flower they will not infect the blossoms. The blossoms not being inoculated, there will be no early twig blight; so that when the aphids come later in the season, there will be no source of infection for them. If, however, there should be affected trees in the neighborhood of the orchard, which is usually the case, then the only way to keep the disease out of the orchard is to control the insects.

The aphids may be kept in check by spraying the trees when the buds are just beginning to swell with home-boiled lime-sulphur, preferably of the strength of twenty-five pounds of lime, twenty pounds sulphur, to forty gallons of water. This is to kill the eggs which may be seen on the twigs and small branches of the tree. To destroy the aphids in summer, give them a thorough drenching with kerosene emulsion. In the fall observe if any aphids are present on the water sprouts, where they will be found if there are any on the trees at all at this time of year. If present, cut off the water sprouts and destroy them.

Several bad outbreaks of the fruit-bark boring beetle in peach and cherry orchards have been traced to wood piles made from diseased and dead wood taken from the orchard. It is in such wood that the beetles winter over and in the spring they issue from it in large numbers and make their way usually to the orchard once more. This shows the necesssity for burning dead and diseased wood taken from the orchard before spring.

Several orchards that two years ago were badly infected with blight, are now,

after being carefully treated as above outlined, free from the disease, and it will now be a comparatively easy matter for the owners to keep their orchards free from the disease by making an occasional inspection during the growing season and cutting out the fresh inoculations that are brought by insects from neighboring property.

We feel certain that if concerted action such as indicated be taken by all fruit growers in any district, the disease may be wiped out of that district and be prevented from entering it any more.

A MEMBER: Is the cutting out the only remedy?

MR. JONES: Cutting out is the only remedy for diseased tissue. In California, where the disease has done so much damage, some enterprising individuals conceived the idea of inoculating trees by treating the trees in such a way that they would imbibe through their roots or through the bark the material with which the trees were treated, ostensibly with the object of giving the tree what an animal pathologist would speak of as antitoxin, to counteract the evil effects of the germs developing in the tree. Well, take it from me that such a method is absolutely worthless. It will have no good effect on the tree but it might be injurious.

A MEMBER: Is lime-sulphur of any benefit in controlling the disease?

MR. JONES: Only in so far as controlling the insects that carry the blight. It is beneficial indirectly.

A MEMBER: If you have a watersprout growing on a large limb, is it necessary to cut off the large limb?

MR. JONES: If the disease has got into the large limb, such as I showed you in the picture of the canker at the base of the watersprout. You may cut around that canker, but the germs are inside the bark. If you cut well around the cankered portion and then swab the exposed area with the disinfectant and paint it over with white lead, you will have the disease cut out and the prevention of the disease spreading.

A MEMBER: If you had several in succession, as there are some in orchards, it would almost mean taking the bark off the top of the limb.

MR. JONES: It would mean taking off the bark around the diseased area, no matter how much that might be.

MR. PATTERSON: You have compared that disease to typhoid fever, Mr. Jones. It has been claimed that you can render a person immune to typhoid fever. Why can you not do so with pear blight, supposing you can discover something of the same nature?

MR. JONES: Well, typhoid fever is a disease which results from the developing of the typhoid bacillus first of all in the intestines, and from there it passes into the blood and is carried around the system in the blood stream. Now, it has been found in some diseases, of which typhoid is one, bodies can be generated within the blood that will have a detrimental effect on these germs, and in fact in some diseases bodies may be produced in the blood stream which will not only counteract the poison produced by the germs, but will also kill the germs themselves. In this condition in the pear tree and the apple tree you do not find the germs in the moisture of the tree passing from the roots to the limbs. We find it in the adjoining tissue. It is a difficult matter at best to produce those antitoxins, and it would mean about twenty times the trouble that you would otherwise go to, without producing the desired effect. You cannot produce an antitoxin for the tree in the same way as you can produce antitoxin for animals.

A MEMBER: Is that disease likely to spread more than it has now?

Mr. Jones: Well, it is the same as with typhoid, notwithstanding that it appears to become quiescent, we must take every precaution to prevent it. Wherever the germs are, there is a centre for the further spreading of the disease, and the disease may be carried by insects or transmitted from diseased trees by the pruning tools.

A Member: Have you noticed this peculiarity, that on Russian trees where there is a very heavy growth, you will find a lot of the twigs killed back for a distance of twelve or fifteen or perhaps eighteen inches, without the formation of very much canker on the limb, or you will find a good deal of canker on the limbs, without very much blight on the ends of the twigs.

Mr. Jones: My experience has been the very reverse, the Russian varieties having much more canker than in the Russets I have examined.

A Member: The Russet seems to be more susceptible to canker.

Mr. Jones: Maybe I may throw some light on the matter. Is it a black canker. There are two kinds of canker. There is the canker produced by the fungus as well as the canker produced by this bacillus. In one case the canker is a swelling on the tree, and it will be very rough on the surface, and will be black when it is matured.

A Member: And the dead bark adheres very tightly.

Mr. Jones: That is the case also with the bacterial canker, but in cases of that kind we have a sinking of the bark rather than the swelling of it, and we do not get that roughness of the surface, and we do not get that blackening of the canker, as if soot had been powdered over it.

A Member: My experience has been in the Russian trees it has been mostly in the end of the twigs, without the development of canker on the limbs.

Mr. Jones: Those large cankers I showed you were on Russian varieties of trees. We have the Roman Stone, and I forget the name of the other varieties, but all these cankers that I showed you starting in the body and on the larger limbs were on Russian varieties.

A Member: Would the fungus canker be readily controlled by spraying?

Mr. Jones: I would not say readily controlled, but you can do much good by spraying, because the spraying kills the spores, the spores fly off and are blown by the wind and lie on the surface of the limbs, and these are killed by the spray, although where there is a large canker present the spraying would not do a great deal of good. It is better to get at the canker.

The Chairman: Mr. Jones has expended a great deal of care and time in connection with this subject, and he deserves the thanks of every member of the Association, especially the pear growers, for the information he has given us. Mr. Jones is connected with the College at Guelph, and I am sure he would be only too pleased at any time to correspond with any of our members and offer any suggestion or advice that he could give.

COVER CROPS IN THE ORCHARD.

Prof. S. Blair, Macdonald College, Que.

I am sure it is an inspiration to me to meet with the Fruit Growers of the Province of Ontario. In our Fruit Growers' conventions in Quebec we do not have such a large attendance as you have here, nor do we have the interest in fruit growing that I see manifested around me in this meeting. You are to be con-

gratulated on the excellence of your show, and the interest that has been manifested in that show. There is nothing in my mind more attractive than the farm. and especially horticultural work. Cover crops and their value in orchard practice has been discussed many times at your annual meetings. The only apology I have to offer for addressing you on this subject is that I consider it one of many important operations in orchard management which should receive more attention if we hope to produce fruit most economically.

The three methods of culture usually recommended in orchard practice are: 1st, The Cover Crop Method; 2nd, The Clean Culture Method; 3rd, The Sod Mulch Method.

There are some who advocate growing trees in sod, but this is undoubtedly an unwise method, and is adaptable to very exceptional conditions, and should not be recommended.

The cover crop method briefly is to cultivate the ground from early spring until the first of July, sufficient to keep a fine earth mulch on the surface, and, at the time of the last cultivation, seed to a cover crop which will produce a good mat of vegetation to work under, either in the late fall or the following spring. The clean culture method is similar to the above except that no cover crop is grown and the ground is left bare, or to be occupied by an occasional weed after the last cultivation early in July.

The sod mulch method is to mulch, usually with manure, the area occupied by the tree sufficient to prevent great evaporation from the soil, and to keep all grass or weeds cut, not allowing them to grow taller than six inches, and letting this material also remain as a mulch. This practice is advisable if conscientiously followed, especially on hilly, rocky, or very open gravelly soil, but what some growers practice and call the sod mulch method, I would call the large hay crop method. It is not the purpose of this address to discuss any of these methods except to place clearly before you the cover crop method of orchard tillage.

If the clean culture method is followed some means must be adopted to get humus into the soil. Without humus our soils become unproductive. Humus not only aids in conserving moisture, but gives as well a better mechanical texture to the soil. It lightens up heavy soils, and makes an open soil more compact. Humus in the soil assures an ever present supply of nitrogen, and prevents the leaching from soils of potash and phosphoric acid. Bacterial life in the soil is largely dependent upon humus, and we must not forget that these lowly forms of life are very large factors in rendering a soil productive.

Commercial fertilizers do not add humus to the soil. They can only be used most economically on a soil not deficient in humus, for otherwise a continuous supply of available food material is not within reach of the plant. I do not mean to say anything against commercial fertilizers, for they can be used to advantage by the orchardist. But what I want to impress upon you is that humus in some form is essential, and if the clean culture method is followed stable manure, or litter of some sort, must be used to furnish it. Manure is not available for many growers, and besides, if cover crops can be grown in the orchard to supply the humus, and not be a detriment but rather an advantage to the growing tree or ripening fruit, why not make use of it?

Many orchards are located on hillsides, and if cultivated a serious washing may occur during the fall or early spring rains, if not prevented by means of a cover crop of some sort.

Nitrogen, one of our most costly elements of fertility, may be largely supplied through a leguminous cover crop, and the purchase of fertilizers confined to the

potash and phosphate manures. If clean cultivation is followed, this free nitrogen cannot be secured. The above reasons are, I think, sufficient to warrant one in advocating the cover crop method of orchard cultivation.

Let us now look at another phase of the subject, namely, the proper ripening of the wood for winter. Winter injuries may result from improper ripening of the wood or it may be due to improper nourishment. Instances of the latter are found in cases where there has been heavy fruitage, which drains the tree of its vitality unless there is sufficient food available to supply the growing tissue as well as the fruit. Nature directs all her effort first to the development of seed to perpetrate the species, and the tissues of the plant are supplied only after this want has been met. Were we to place within the reach of our trees food as required, I think we would hear less about the winter killing of our bearing trees. The improper ripening of the tissues of a tree may be due to an excessive food supply, or excessive moisture conditions in the soil, or to a continued high temperature. The temperature and food supply are largely influenced by the moisture conditions, although a combination of these factors are responsible for late growth. The moisture conditions are in a measure within our control by the use of cover crops. In irrigated districts the grower has absolute control of this factor and can ripen off his trees when he wishes by the withholding of water. We have no such absolute control in the use of cover crops, for excessive rains at a certain period may largely counteract any drying effect we wished to produce through the use of a cover crop that tends to dry out the soil.

The following table will give some idea of the relative drying effect of various cover crops. These experiments were conducted in our young orchard, and show the percentage of moisture in the soil on the middle of September: Millet, 7.24; Oats, 10; Rape, 10.1; Winter Rye, 11.6; Crimson Clover, 11.8; Buckwheat, 11.8; Red Clover, 12.3; Vetch, 12.8; No Cover Crop, 14.9.

It will be noticed that the strong growing cereal crops and rape will run down the moisture contents of the soil very rapidly, and for this reason they may be advisable in some cases. The oat plot had four per cent. less moisture than the check plot growing no cover crop. Crops that form a dense mat prevent evaporation from the soil, and this is one reason probably why the clovers and vetches do not so materially reduce the moisture contents. It was found also that the quick growing cereal crops reduced the moisture of the soil earlier in the season than the clovers, especially than the red clovers, which requires a longer period to form much leaf area.

The following experiment, however, proves quite conclusively that the soil moisture conditions can be controlled more effectively by the date of seeding than by any particular cover crop. Crimson clover was sown on June 15th and on July 15th. The soil samples taken on the 1st of September showed 6.1 per cent. of moisture for the early seeding as against 12.03 per cent. for the later seed plot. These results are what one would expect, and the date of seeding advisable for different sections and different types of soil can only be determined by conducting similar experiments in your section. After conducting various tests we have settled on the last of June or early in July as the most suitable in our section for ripening young trees.

If trees are carrying a good crop of fruit there is little likelihood of the fruit not ripening well, and it would certainly be unwise to dry out the soil too much by early seeding of the cover crop, for this reason I advise later seeding in the bearing orchard; say the middle of July. It is well also to keep in mind that cover crops make a much more rapid growth in a young bearing orchard, where

there is little shade, than in an old one heavily shaded, and the transpiration in protected areas is not nearly so great as in the unprotected.

I would say also that whereas a cover crop may dry out the soil early in the season, that does not imply that the soil will continue dry until late fall, and injuries from dry winter freezing result, for our experiments go to show that when a dense covering is formed it so protects the soil that little evaporation takes place in the late fall, and the ground by fall will actually contain more moisture than the areas not so covered. Winter-killing of the root is more liable to occur in a dry soil. This is not of special consideration in northern sections only, for winter-killing is often caused by alternate freezing and thawing, which has greater range in a somewhat dry soil than in a moist soil, for the more water a soil contains the less liable is it to frequent alternate freezing and thawing.

Cover crops were first used for the purpose of keeping frost from penetrating the ground and at the same time prevent alternate freezing and thawing. It will prevent the latter, as we all know from experience, and experiments go to show that a moderate mulch on the surface will keep the frost from penetrating less than half the depth that it will on unprotected area. The frost penetrating the soil may not prove injurious, but alternate freezing and thawing must be guarded against.

It is usually not advisable to plow under a cover crop in he fall. There is much less liability to washing of the surface soil, and the mulching effect is better if it is on the surface. It also serves to hold the snow, which is one of the best protective covers we can have.

Personally I think it does not matter whether the cover crop stands the winters or not. In fact, the only advantage that I can see in having one that will stand the winter is to dry out the ground early the following spring. The danger, however, is that we may allow them to grow too long before plowing under and rob the ground of much moisture that might have been conserved, and as well deprive the tree of its full early spring breakfast.

The following experiments, which I personally conducted, show the effect of winter rye and red clover in reducing the moisture contents of the soil, as compared with the early cultivated crimson clover plot. A plot of oats sown on a adjoining plot on June 20th was also compared as to the percentage of moisture at different dates. These plots show how quickly the moisture contents of the soil can be reduced by crops in the orchard in the spring and early summer months:

Date Samples were taken.	Winter Rye.	Oats sown June 20.	Crimson Clover plowed under May 13th.	Red Clover not plowed.
May 12	18.41	20.	20.88	18.93
" 26	17.21	18.02	21.21	18.97
June 9	12.52	17.84	20.31	14.04
" 23	10.46	17.40	20.46	11.65
July 7	9.06	16.70	19.14	11.22
" 21	7.46	13.43	20.54	12.06
Aug. 4	8.23	9.49	18.11	10.36
" 18	9.80	10.30	20.26	13.66
Sept. 6	17.79	16.99	24.04	20.22
" 20	14.91	16.31	18.09	19.87
Oct. 31	21.33	19.77	26.02	19.71

The clover plot was given clean culture, and no cover crop was used on any of these plots. The fall was a moderately wet one, and these plots each contained approximately 20 per cent. of moisture, which amount our experiments indicate

is about right for the most successful wintering of the tree. One of the bad effects of drying out the soil early in the spring is that the subsoil water is lost, whereas it should be retained for the crop later on, as it is this water on which the crop depends later in the season. The tabulated data shows only the condition of the soil to one foot in depth, but soil to a greater depth would show as great a variation.

It is advisable, except in cases where the ground has an excess of nitrogen, to use leguminous cover crops. The crimson clover and common vetch we prefer. Both of these make an ideal cover. The mat is not objectionable at picking time and it forms a good protective covering. We find that the clover can be worked under with greater ease, and for that reason we use it principally. The two mixed together are good.

Red clover does not make sufficiently rapid growth in my opinion, and we do not use it, except in our comparative tests. We get a much better protective covering with the crimson clover, and a very much greater bulk of material to turn under.

A mistake is often made in using too little seed. Never use less than 25 lbs. of crimson clover seed and 75 lbs. of vetch seed per acre.

In seeding to clover we run over the ground with a tilting spike tooth harrow, sow the seed and harrow with this tool again, having the teeth upright, and again harrow with the teeth tilted, to leave a perfectly smooth surface. The seed can be safely worked in to a greater depth than is the case with the smaller red clover seed. In seeding vetch I prefer to use the spring-tooth harrow, which leaves the soil more in ridges, and after seeding this is again used, followed by the levelling harrow.

I have never yet had any difficulty in getting a good catch from seeding on a properly cultivated area. If the ground is thoroughly dried out on the surface there may be trouble, but in such cases I would advise working in the seed more deeply.

There are other points we could profitably discuss, but I feel that I have already taken up too much of your time.

A MEMBER: Do you not think that cover crops harbor mice?

PROF. BLAIR: Yes, I do. I think the only way is to buy wire protectors for the trees, as they protect your trees in cultivation and also from the mice. They cost very little, and it prevents your work of four or five years being all undone.

A MEMBER: Crimson clover is an annual. Over a great portion of this Province it is not hardy enough.

PROF. BLAIR: I do not think it makes any difference whether you use a crop that will winter or not. In fact, I prefer one that will not winter.

A MEMBER: How many pounds of vetch do you use?

PROF. BLAIR: Seventy-five pounds.

A MEMBER: Do you plow close to the trees?

PROF. BLAIR: Yes, but we run the plow over as we come to our young trees. If you plow close to your trees from the start, you will see it will result in forcing the trees to deep root.

A MEMBER: Is that the hairy vetch you use or the common vetch?

PROF. BLAIR: No, we do not use the hairy vetch.

A MEMBER: What do you find with reference to nitrogen gas with the hairy vetch? We find the hairy vetch makes too great growth. With the ordinary vetch do you get as large quantities?

PROF. BLAIR: Yes, I think you would with the same clover. We have never carried on any soil analysis with these different cover crops.

THE CIDER INDUSTRY.

Louis Meunier, Paris, France.

Great improvements have taken place within the last few years with regard to the growing and shipping of apples. Thanks to your Fruit Growers' Associations, Canada is coming rapidly to the fore, and you can now supply the European markets with fruit in better condition than their own. Some Canadian growers think that the Canadian Apples have a bad reputation on the other side, but in this I do not agree with them. To give you an idea of the popularity of your fruit, not only on the British market, but even in France, I will tell you what I heard in Paris. A pedlar stood in a crowded street with a fine load of apples. "How pretty they look," said a lady passing by, "They are Canadian apples, are they not?"

It is quite apparent that you take better care of your orchards than the growers in the Old Country. Here pruning and spraying are the rule, as well as good packing. And yet you complain because you cannot compete with the Australian and Californian growers. They pack in boxes and it seems that it suits the dealers better. But the trouble is chiefly caused by the culls being mixed with the better grades. Notwithstanding the greatest care, you get a certain amount of scabby, worm-eaten, ill-shaped apples, as well as sound windfalls. Practically these culls have no value, whilst the first and second grade are always sold at reasonable prices. Temptation is inherent to human nature, and in most cases the packers try to raise the culls up to the level of the first or at least the second grade. As long as it is not possible to turn the culls to good account, it will be very difficult to avoid this trouble.

Some months ago, when in London, I asked an apple dealer, "How can you explain the superiority of the Australian apples sold on the English market?" He answered that in Australia they use the culls to feed hogs and make cider, only shipping the best grade.

Can you do the same, and will it pay?

Let us study the question.

There are already many growers who feed the culls to their hogs. Let us consider what 10 lbs. of culls would produce in that way.

Apples are very poor in nitrogen and you can't build up a pound of flesh without a good deal of that element. I calculated that 60 lbs. of green fruit are needed to make a pound of flesh. If you estimate it at 12c. a pound, you see that 10 lbs. of green fruit will only give you a return of 2c.

Let us now turn our attention to cider-making.

The juice of culls is the same as the juice of sound apples, the only difference being in the appearance of the fruit. Therefore, there is no reason why you could not make good cider with cleaned culls.

What is the wholesale price of cider in Toronto, for instance? 16c. a gallon on the average, and how many pounds are required to make a gallon. By the French way, not more than 10 lbs.

In this Province, even for a very small factory, the cost of the making and shipping will not exceed 8c. a gallon. Therefore, turned into cider, your culls will give you 8c. per 10 lbs.

And now the pomace (that is to say the pressed apples) should not be thrown away, as is generally done. This pomace is much richer in nitrogen than the apple itself, as the nitrogen, being insoluble, is not crushed out with the juice. In other words, you can fatten nearly as many hogs with your pressed apples as

with the green apples themselves. Every ten pounds of green fruit will consequently give you a return of 1c. at least by feeding hogs with the pomace.

That is to say that 10 lbs. of culls will give you a return of 9c. by making cider and feeding hogs.

It will pay you $1.35 a barrel, which shows that they are worth saving and profitable without shipping with the better grades. The culls will pay 90c. per 100 lbs., whereas the driers and canning factories give you only 50c. per 100 lbs. for high grade culls, and very often they could do no better without losing money.

Therefore, cider making is a profitable business, and yet I have heard of many failures in this country.

When in Montreal I said to friends that there was no better drink than cider, and I backed my opinion with quotations of celebrated English and French people.

My friends ordered a barrel of cider. The day after they received it, very naturally, I went to pay them a visit. As soon as I arrived, I was told that they had sent a barrel of vinegar by mistake. My friends thought it was vinegar, but it was really a very hard, very sour, and poor quality of cider. To get a fair price you don't only want to make cider, but to make good cider, and to do this you want the right apparatus and process.

It is quite obvious that you are not satisfied with my statements. Why? Let me follow your thought.

This Province has to get rid every year of several million bushels of culls. If we turn it into cider will there be enough people to drink it, and, supposing so, what will be the price?

Well, I was sure you intended to object in that way, and I prepared my answer: "Is there no market in the world but that of the Province?" On the contrary, it seems that for cider you can hardly find a smaller market than here. To get important sales and high prices you have to reach other countries. Great Britain, Quebec and South America are fit markets for cider, but any cider is not fit for these markets, and if you don't ship the right cider to the right place, it will always be a failure. The wholesale price in London is, on the average, 28c. a gallon. Therefore, by shipping to England, you can obtain a much higher profit than by selling your cider here. Some Nova Scotian and Ontario cider makers have fully realized this fact, and, thanks to them, the exportation of Canadian cider has increased very quickly.

In 1903 they shipped cider to the value of $810. In 1906 this export had increased to $9.400, while in 1909, 135,244 gallons were shipped, representing a value of $27,953. This looks very much, but it is just a drop to quench the thirst of John Bull. And yet, do not think that John will drink every kind of cider. If you don't send him the right one, don't expect to make him a good customer. English people like Devonshire cider. You can't change their minds. You have nothing to do but to make cider of the same kind, if you intend to supply the English market. Can you do so and succeed? Certainly. Many of your varieties of apples suit this industry, but you must employ the right method, as a certain Nova Scotian cider maker already does.

And now let us look at Montreal. Nearly all the dealers I saw in this town say that they have more demand than offers, and the price in Montreal is much higher than in Toronto, and besides the consumption of cider by each inhabitant is much greater in Quebec than in Toronto.

Is there a kind of cider preferred by the French Canadians? Certainly, and as you may guess they like the cider prepared in the French way. Generally the

Canadian apples are not fit for the making of this cider, and the success will greatly depend upon the choice of the varieties. You know that the rule in France is to blend at least three kinds, one acid, one sweet, and one bitter. On the average, the Canadian apples are acid varieties, and so you have to make a selection. I would suggest the following blending as suitable:—Spy, Talman Sweet, and some crab apples. But you want more accuracy, and consequently a careful study of your varieties from the cider-making point of view.

Let us now talk about a third kind of cider, that is the German cider. The makers of Frankfort and Stuttgart call it Aepfelwein, that is to say, apple wine, and their process is such that they make a kind of cider which reminds one of white wine. The great advantage of the German process is that one can employ every variety. Some of the German factories are very important and supply not only the European markets, but also some African and South American countries. They ship to the latter hundreds of thousands of gallons, and the price of cider in Frankfort is more than 20c. a gallon. From that statement you can see the advantage offered by the Sourth American market.

I will now leave this question of the cider industry and try to resolve the following problem: Are there any other ways in which we may turn the culls to very good account? Yes, we can make apple-juice, liqueurs, cakes, etc., and some of these industries will pay as well, and, perhaps better, than cider-making. Thanks to the campaign of temperance, there is now a big demand for apple-juice. Many of the apple-juices sold, however, are far from being free from chemicals and preservatives, and in that way they are much more injurious than the strongest cider. But there are methods to make apple-juices without preservatives.

In France a sweet liqueur made with apples has a great sale, and it is quite apparent that with your delicious eating apples, as Snow, Spy and King, you could do the same.

Apple cakes are sold in England at the rate of 10c. a pound, and you can make them with cleaned culls.

In short, you have many good ways to make a lot of money from the culls, and doing so you will at the same time get a higher price for your sound apples.

The Co-operative Fruit Growers' Associations are thriving in Ontario. It seems to me that if they were to take this matter of cider-making in hand it would be very profitable, and a great benefit to the Canadian fruit growers.

Here are the results if my investigations. I am much obliged to the Department of Agriculture, who gave me all suitable introductions for my study. I am particularly thankful to the Honourable Minister, Deputy Minister, and Director of the Fruit Branch, who assisted me in my researches.

Moreover, I am glad to say that the President and Professors of the University of Toronto were kind enough to give me all accommodations to carry on some experiments with regard to a more extensive use of the Canadian apples.

MR. CASE: I would like to know if this gentleman can tell us anything about the chops. During the last year this trade has fallen off. What are those chops used for in France?

MR. MEUNIER: The chops were used in France to make ordinary cider, but now the people are not allowed. There is a new law for pure food. In the large centres, such as Havre and Paris, there is a great consumption of that kind of cider made with your chops.

MR. CASE: Is the demand for it liable to increase?

MR. MEUNIER: I think so. I would like now to show you some samples of

cider to make quite apparent the difference in the two kinds. I have here a bottle of cider made by the English way, and, as you see, it is perfectly clear and of a very light color. This other bottle of cider reminds one of the French cider, but not by its taste. As you see the English cider is quite clear, and this other is rather turbid, and the English people will say, "This is not cider at all; it is just mud." If you ship this English cider to France the people will say, "It is much too clear, it is just water and chemicals." I have also some cakes here to show you.

RESOLUTIONS.

District Representatives.

"Resolved, That this Association appreciate the work of the Department of Agriculture of Ontario in extending agricultural instruction by District Representatives to some of our Counties, and recommend that they will speedily extend the system to as many other Counties as possible."

Losses to Fruit Growers through Express Companies.

"Resolved, That this Association respectfully call the attention of the Express Companies to the annoyance, inconvenience and serious loss sustained by shippers and consumers of fruit on account of the pilfering from express fruit packages in transit, and also the careless handling which results in the broken and damaged condition of the package, these evils having become so notorious as to constitute a positive injury to the business, which curtails consumption and exposes the shipper to a serious financial loss, for which compensation is practically refused by the Companies."

Short Courses on Agriculture in Public Schools.

"Resolved, "That this Association recommend to the Ontario Government to further extend the good work done by the District Representatives, by giving short courses in the public schools on the rudiments of agriculture, giving special attention in fruit districts to insect pests and fungus diseases injurious to fruit trees and fruit."

Mr. Smith: I am sure you will all agree with me that Ontario should take a more prominent position than she does in the consuming markets of the world with respect to her apples. British Columbia, as most of you know, has done a great deal to advertise that Province. They never lose an opportunity to advertise and display their fruit. It is a well known fact that a country which produces such excellent fruit is a country worth going to. Now, I dare say there are thousands of men going to British Columbia from Great Britain, men with means, and it is largely due to the fact that that country is advertised. I think all of you will agree with me that this Province presents greater opportunities to men of limited means who desire to make a home than any other Province. We can grow apples to perfection, as well as peaches and grapes and other fruits, and the districts where these can be grown are greater than we thought they were. It seems to me it ought to be the duty to a great extent of the Government of the Province, and it is up to us to consider whether the time is not opportune. I have a resolution here as follows:—

Canadian National Apple Show.

"Whereas, It has been proposed that a Canadian National Apple Show should be held annually in Canada, and, whereas, the first Show of this nature has been held this year in the Province of British Columbia, proving a great advertisement for the fruit-growing possibilities of that Province; and, whereas, the fruit-growing resources of the Province of Ontario are not realized as they should be either at home or abroad, be it resolved that the time is opportune for the holding of a Canadian National Apple Show in the Province of Ontario on a mammoth scale, and that this Association take steps at this Convention, by the appointment of a Committee, to further consider the matter, and, if deemed advisable, to later proceed with arrangements for the holding of such a Show in Ontario in the Fall of 1911."

The adoption of the resolution was voted on and carried.

Mr. Smith: I would make a suggestion that that Committee be the Board of Directors of the Ontario Fruit Growers' Association.

Mr. Robertson: I second that.

The motion was duly put to the meeting and declared carried.

Mr. Smith: Then there is another resolution:—

"Resolved, That, in view of the possible negotiations with the United States in regard to reciprocity of tariffs, the Ontario Fruit Growers' Association wish to put on record our unqualified disapproval of any reduction in the duties on fruit coming into Canada without consulting a Committee to be appointed by this Association, the duty being now much lower on an average than the duties on manufactured goods, and lower than they ought to be in view of the fact that there can be no monopoly or combine in fruits, the prices being fixed absolutely by the law of supply and demand within the Dominion, which contains ample territory suitable to produce in the utmost profusion all the fruit that the country can consume for at least many decades to come, which insures that the consumer cannot be injured in the long run, and the fruit industry can be extended in proportion to the growth of the population, with some assurance of a permanent market at home."

Mr. Robertson: I second that.

Mr. Lick: It seems to me that should not pass without discussion. I would move that it be laid on the table, and if there is any time later it should be taken up and discussed.

Mr. Thompson: I think some of those resolutions that require discussion could be dealt with a great deal easier if they were referred to a special Committee. We haven't time to properly discuss them.

Mr. Smith: I don't see how any Committee could deal with this. This is supposed to be a representative meeting of the Fruit Growers of the whole Province, and they alone can finally express an opinion with regard to this.

Mr. Pattison: It strikes me it is time enough to cross the bridge when you come to it. We have a pretty long programme laid out, and I would suggest that a representative committee of this Association be named, and that the resolutions be referred to that Committee.

Mr. Smith: That would mean that this Committee would either have to submit to the Government its own recommendations, or else a meeting of the Ontario Fruit Growers' Association would have to be called to discuss the question, and I think you would get a small gathering. This is an opportune time now. The

grain growers have been down to the Government already, asking that duties be taken off many articles, and the wholesale merchants of Winnipeg, I understand, have been before the Government, and I think this is the right time to discuss the question. When will there be an opportune time if it is not when the Government is proposing to negotiate with the United States, and those who want duties removed have already put in their views. Are those of us who are interested in the industry going to sit still and not make a move in this matter? When the Government have their negotiations with the United States it will be practically settled.

MR. THOMPSON: I think we all agree with the resolution. As I understand it, there is to be no change, but it is possible there might have to be some change. We don't know what might take place. I for one would be willing to leave it to any half-dozen of our fruit growers to meet the Government, as we did on two occasions before. We are all agreeable that we don't want the tariff lowered at all, but there are some things that might be changed the other way.

MR. A. W. PEART: There is a great deal of truth in what has been brought forward by all the gentlemen who have spoken so far with regard to reciprocity. I fail to find any difference of opinion, so far as the principle of the resolution is concerned. There appears to be no difference in the opinion that reciprocity is not desired by the fruit growers of this Province. However, it is just possible there may be inequalities in the tariff which it might be well to have modified in some way, and for that reason it might be better to appoint a representative committee to deal with matters of that nature, and adopt the principle of this resolution.

MR. THOMPSON: I would move an amendment to the amendment if necessary, and I think Mr. Peart will second it, and that is a Committee should be appointed to look after our interests. My amendment is that the principle is all right, but a Committee should be left to work it out.

THE CHAIRMAN: I think it would be better to appoint a Committee and consider it later on. I think it is hardly fair to force this on the members, as they have not had time to consider it, and they would hardly be in a position to give a fair vote. I think the matter should be left over for future discussion.

MR. SMITH: I did not mean by this resolution that there would be no reduction on any one thing, but no reduction on the average.

MR. BUNTING: How would this answer, "To express our disapproval of any change being made in the present tariff without consultation with the Association," and then appoint a Committee to deal with the matter.

MR. SMITH: I am quite willing to put that in.

MR. BUNTING: Don't you think as fruit growers you are occupying a little too modest a position? For instance, the grain growers are going to press hard for a change, and the fruit growers only say, "We beg there will be nothing done without consulting us." I think it is not occupying a strong enough position.

MR. LICK: I did not intend to take part in the discussion, but I wish to call your attention to this fact, that the majority of the apple growers in this Province would be better off if we had free trade in apples, but we do not want to be a party to anything that is going to work an injustice to any fruit grower who has invested his money. The present tariff is certainly a very serious injustice to Canada. If something of that kind had been worked into the resolution I could have supported it much more heartily.

MR. WALLBRIDGE: It would be a bad matter for us if the United States apples were let it free.

MR. SMITH: I would suggest this: "That we put on record our unqualified disapproval of the principle. and that no change should be made without consulting a Committee to be appointed by this Association."

MR. THOMPSON: I withdraw my amendment to the amendment and support this.

The Secretary read the resolution as amended, and, on a vote being taken, it was declared adopted.

MR. BUNTING: I would move that MR. THOMPSON, MR. LICK, and MR. SMITH be a Committee to name the Committee who would deal with this matter at the proper time, and report to this Convention.

The motion was duly seconded, and, on a vote being taken, was declared carried.

PROFITS FROM MY APPLE ORCHARDS.

R. R. SLOAN, PORTER'S HILL.

Let us take for a basis a ten-acre orchard, and try to figure out the cost and expenditure per acre for four years. We will take a section of orchard containing 350 trees. I do that on account of part of it being grafted, and did not bear at the same time. Ten acres usually contain about 400 trees, or 40 trees to the acre. We will go back to 1907. Of course I will not give you all our profits or all our losses, but we will take it so as to get as near as we can to the subject allotted for discussion. In 1907 we had 700 barrels of apples from these 350 trees, and they were sold at $1.65 per barrel on the ground, or $132 per acre. The varieties consisted of Ben Davis, Baldwins, Greenings, Spies, and Kings. In the following year, 1908, the crop was much lighter, only 250 barrels from the same area, at $1.50 a barrel, or $45 per acre. In 1909 we harvested a heavy crop of apples, upwards of 2,000 barrels, the section referred to producing 750 barrels at $2.25 per barrel, or $192.80 per acre. In 1910, the present year, the apple crop in Huron County was almost a complete failure. Nevertheless, we harvested nearly 100 barrels off these 350 trees, at $3.75 to $4 a barrel, or $43 per acre, giving a total of $413.40, or $103.35 as the average for four years off trees from 17 to 20 years of age. Mark the age of those trees. They are only young trees.

Now, let us look at the cost of production and maintenance of the trees. It would cost $2.35 per acre for plowing. Of course that may not correspond in all districts, as you can get labor and horses cheaper in some sections of the country than others, but that is about an average. Then $1.05 an acre for cultivating three times; $3.75 per acre for pruning; $8 to $9 for a man to spray. That is the total cost for three sprayings using bordeaux mixture. Last year we used lime and sulphur, which cost a little more, for the first spraying, an arsenate of lead along with it. Then there is fertilizing at the rate or $2.50 per acre up to $3, for manure and ashes. It is sometimes difficult to get ashes, but we get a great deal of manure at 50 cents a load and draw it ourselves. Of course, the benefit of fertilizing is spread over a number of years. The cost of pulling at 10 cents a barrel would be practically $9 per acre. That makes a total of $27.60 as the

total cost per acre, without counting anything for cover crops, which in some sections would cost much more than others. We generally grow clover, and if we don't we always have sufficient snow. Of course we grow the clover for its manure value. This deducted from $103.35, the average for four years, leaves a balance of $76.35 per acre, or $763.50 for ten acres. We have some sections of older orchard, which, of course, gives much better results. I will not go into details, but give you one example of what they have done on several occasions. One plantation sixty years of age, consisting of 35 Spy trees, have run as high as $18 per tree, and even at the low price of $1.50 per barrel have yielded $530 per acre. I may just say Huron County this year has the lightest crop of apples that it has ever had in the past twenty years. Last year we had a quarter of a million barrels, and this year we hadn't a thousand barrels of apples in the whole County, not enough for home consumption. The failure this year was attributed to the cold, wet spring, along with the blight which covered the whole country. I have asked several here, and it hasn't been universal in the Province, but it seems to be in the Georgian Bay district and along Lake Huron. This blight came on the trees just about the time the blossoms were setting, and it blackened the leaves to a certain extent, and in the unsprayed orchards the trees were in such an unhealthy condition many of them fell off in the month of September, whereas they should have stayed on till nearly the present time. In the orchards that were sprayed the leaves seemed to get over the blight and become quite green again and stayed on the trees. We sent some samples to Guelph to Mr. Caesar, and he examined them and reported that there was no bacterial or fungus diseases that he could find, so we do not know what it was yet. However, we attribute it to the cold, wet weather along with two rather severe frosts we had at that time. Huron this year was unable to make an exhibit because we didn't have the product with which to do it, but I think if we have the apples we can make a display that will compare favorably with any exhibit put forth by any of the Counties.

ORCHARD PROFITS IN GEORGIAN BAY DISTRICT.

J. G. Mitchell, General Manager The Georgian Bay Fruit Growers, Limited.

Your Secretary, Mr. Hodgetts, asked me to prepare a short paper that would give some idea of the profits that could be derived from apple growing in the Georgian Bay district. This was supposed to have been a bad year, but for all that the orchards that were cared for had splendid crops.

Generally speaking, it is a well-known fact there were practically no good apples worth considering in the Counties of Bruce, Grey or Simcoe this year, except the demonstration orchards of the Department of Agriculture near Collingwood, and a few orchards owned by stockholders of the Georgian Bay Fruit Growers, Limited, at Thornbury.

Now, was the year to blame, or was it the growers, for the tremendous failure of the district this year? Let us see. These orchards of the Georgian Bay Fruit Growers, several of which I own and control, and the others receiving about the same treatment, were a most signal success. There was nothing done for them that other growers could not just as well have done. They only received reasonable care and attention, which any orchard to be a success must have. This in-

cludes pruning, spraying, cultivation and fertilizing. It is unnecessary to give a detailed statement of all these orchards, but I will submit figures of one. This is a small orchard of about two and one-half acres, and had not been pruned, sprayed or cultivated in fifteen years. When I took it over last spring it was more like a forest than an orchard. It had not borne much for years, only from 20 to 40 barrels a year, and this mostly No. 2. This fall I harvested 170 barrels, grading 80 per cent. No. 1, with practically no culls, except windfalls. The proceeds of this orchard were as follows:

170 Barrels apples, No. 1 and No. 2	$540 00	
Windfalls and culls	20 00	
Total receipts		$560 00
Expenses:		
Orchard work, pruning, spraying, etc.	$170 00	
Harvesting crop	67 00	
Barrels	68 00	
Total expenses		$305 00
Balance orchard profit		$255 00
Less rent paid		60 00
Net profit for year		$195 00

This is, I think, a fair representation of what the other orchards did that received the same treatment. Next season we expect to get still better results, as these orchards are just beginning to show the effects of proper attention.

Now this ought to be a pretty forcible object lesson for the great many who are neglecting their orchards in our district. Had they all done what we did, in my opinion there would be no reason to cry bad year. If all the growers had given the proper attention there would have been about 300,000 barrels in our district, and I believe this to be a conservative estimate. As it was, many had no apples for their own use.

This will give you a little idea of what the orchards of our district can produce if the growers will only wake up, and I certainly think they will.

Q.—How many trees in that orchard?

MR. MITCHELL: I could not say. I did not count them.

Q.—Were they planted pretty close?

MR. MITCHELL: They were planted in the old way. I tried to persuade the owners to prune it up, and they said they couldn't be bothered with it. I told them I would run it for them if they would put a reasonable price on it. I said, will you take $50 for it, and of course they jumped at the chance. Well, I said, I will give you $60, but you must allow me to do as I please, and we drew the lease in that way. I said there are some trees I want to cut out. So I had absolute control of the orchard for five years, and I have given you the results. I expect 300 barrels next year.

Q.—What kinds are they?

MR. MITCHELL: There are a few Spies and Greenings and a few Gravensteins and Colverts. It is a mixed orchard.

Q.—Did you plow it up?

MR. MITCHELL: No, I didn't plow it; but we will cultivate it next year. It was so very thick the sun couldn't shine through it.

Q.—Did you manure it?

MR. MITCHELL: Yes, the manure is included in that expense. Now, if you talked to our farmers through the country about spending a hundred dollars an acre to get some apples they would go crazy. They would almost die in their tracks: but they will have to get busy and do it, or they won't get the stuff. The apple orchards in this country are starved. It is about fifteen years since the apple business in the Georgian Bay began to go down and it is getting worse, and it is the poor stuff that is being shipped away that is killing the market and ruining the reputation of our apples.

Q.—About what percentage of the top of each tree was removed?

MR. MITCHELL: We removed probably from two to ten feet.

Q.—Did you take that off the top or two-thirds off the top?

MR. MITCHELL: If there was a lot of dead stuff in it, we cut that off first. There hadn't been a saw in it for fifteen years, and we had to take a cross-cut saw sometimes. Then when we got this cut away from the bottom, we could get up to the tops and cut out what we considered necessary, from two feet up to ten feet. We cut them back where there was a branch getting too long, not straight across of course.

Q.—What proportion of the tree do you suppose you took away?

MR. MITCHELL: Well, some of them, I suppose one-third. We got them so we could pick them with ladders.

A MEMBER: I went into a similar orchard myself this season, and we have cut at least half the top out of each tree, and the point I want to get at is whether I could have taken them out all at once profitably?

MR. MITCHELL: Well, we went around from the outside. There were people came from all over the country because it was known to be an orchard that was no good, and I rented that orchard more for a demonstration than anything else. I thought if I took hold of the worst orchard I could find and put it in shape people would say if he can make that orchard pay we will take care of ours next year. There was another orchard was taken care of according to my directions, and it was sprayed, and had a good crop of fruit when the other orchards all around had nothing, and the others say now they will have a proper outfit next year.

Q.—When did you do your pruning?

MR. MITCHELL: In March, and I did the spraying just as the buds were showing to burst.

Q.—Could you have safely pruned those trees in January?

MR. MITCHELL: Well, I suppose you might, but we don't do that. It is too cold.

Q.—Would you take a tree that has been badly neglected in that way and trim it down in one year?

MR. MITCHELL: I couldn't tell you without seeing the tree. As a rule I wouldn't do it all in one year, as there is a possibility of shock. It might stand it, but there is a danger. We have some pruning to do in this orchard yet.

Q.—Do you charge all your personal work to that orchard?

MR. MITCHELL: Yes, everything is charged up there. It is all hired help.

STANDARDS FOR JUDGING OF FRUITS AT EXHIBITIONS.

APPLES.

HAROLD JONES, MAITLAND.

It has been recognized for a long time that there is a lack of uniform standard and wide differences in opinion by both exhibitors and judges as to the kind of fruit that should be shown to make the best plate, and judges differ so in their opinion that confusion is made worse.

Score cards have been printed for the use of judges by several societies, but they have been found faulty and very few judges will use them as the scale of values have led in some cases to awarding prizes in contradiction to their own judgment.

At the last annual meeting of this Association a committee was appointed to take this matter in hand and try to draft a scale of points or score card and adopt a uniform standard for exhibitors and judges. The chairman of this committee, Mr. W. T. Macoun, has kindly loaned me a copy of a score card proposed by the Fruit Growers' Association of Nova Scotia, which has since been adopted by that Province, Prince Edward Island, New Brunswick Associations and also Quebec.

This card gives for Single Plates named:

Points—	25	Freedom from blemish
	25	Color
	20	Uniformity.
	15	Form.
	15	Size.
	100	

The following score card is for Collections:

Points—	20	Freedom from blemish.
	15	Color.
	10	Uniformity.
	10	Form.
	10	Size.
	10	Commercial value.
	10	Quality.
	10	Nomenclature.
	5	Arrangement.
	100	

And appended is an explanation of the terms used.

Freedom from Blemish. Any injury by insects, fungus, bruises, loss of stem or other cause lessening the value of appearance of the exhibit may be called a blemish.

Color. Bright, clear, well-developed color characteristic of the variety.

Form. Represents the perfect or normal type of the variety.

Uniformity. Specimens should be as nearly alike in size, form and color as possible.

Size. Indicates care and skill in production, and usually, other points being equal, size wins.

Commercial Value. Standard known market varieties, as grown in and suited to the district, preferred.

Quality. To be considered in collections, seedlings, new varieties on trial, or other sorts in competition.

Nomenclature. Exhibits must be correctly named according to the nomenclature adopted by the Society, Association or exhibition at which they are shown.

Arrangement. Taste and skill in staging so as to attract attention and add to the general appearance of the exhibit.

Season. Collections should contain varieties that prolong the season of use.

The score for single plates named will work out with splendid results. The one for collections might be changed slightly, giving five points for nomenclature or correct naming instead of ten and adding five points for season.

It is the intention of societies and associations when they offer prizes for the best seedling to bring to the attention of the public any new variety. It is just at this point that the average judge breaks down. The prize lists generally give a first and second for the best seedling. When the judges consider these exhibits they find them entered on number and in at least 50 per cent. of the entries known named varieties are shown.

The first problem is how many of these are named varieties, and the judge feels that he is in duty bound to name the varieties and rule them out or give the prize to the plate with the best points.

I have judged fruit more or less for over 25 years and I have never felt perfectly satisfied with my work at this point on account of the possibility of awarding a prize to a named variety that I could not identify and classing it as a seedling.

I would suggest that a special score card for seedlings be drawn up giving:

Points—	10	Freedom from blemish.
	20	Color.
	10	Uniformity.
	15	Form.
	15	Size.
	25	Texture and quality.
	5	Season—meaning the length of time or period of its usefulness.

I would suggest further that our Association use every means in their power to have every agricultural society or county fair board and exhibition committees print in their prize lists every year the scale of points for judging fruit, with the explanation of terms and have all exhibits of seedlings shown under the owner's name with his post office and county and the age of the tree, leaving off the exhibitor's number so that there would be no key by which the judges could identity any fruit he might have in the general exhibit. The associations to provide suitable cards for the purpose.

This last clause would add to the value of the exhibit and simplify the work for the judges.

I do not wish it understood that I would advocate the scoring of a whole exhibit for that would entail work upon the judges that would be practically impossible to accomplish in the time usually allowed for such work, but have the scale of points as a guide and help at the deciding point and as a means of overcoming differences of opinion between judges.

To give a case in point: I was judging with an acknowledged authority at one time and we had a rather good lot of Fameuse to work on. It simmered down to three plates, and then to two, for first prize. One of these had full points on color, uniformity, and everything except size. The other was perfect in everything

except color, and it was off four or five points in this respect, but was at least one-sixteenth larger. My fellow judge said, "Consider the earliness of the season; see what the color will be in a week or two; size is everything in Fameuse, etc." I gave way to his judgment, but was not quite satisfied.

This brings up the question of judging immature fruit at county fairs. I leave it to the meeting for discussion.

MR. WALLBRIDGE: It seems to me there is a very important matter that should be attended to in connection with the inspection of apples. You will see many of our fruit growers and many of the public inspecting the apples who do not know what varieties they are, and it would only be a matter of trifling cost to have little cards printed and put on each box. It would be instructive to have them.

MR. JONES: Every plate is supposed to have the name of the variety on it, and it must be on there or the judges cannot act. That is one of the rules of the Association, and that is general all over the Province.

MR. WALLBRIDGE: It is important that the boxes and barrels of fruit should be labeled.

MR. JONES: It is a very important thing. We can throw it out as a suggestion to our societies that they should provide printed cards with the name of the varieties suitable to their districts.

MR. WALLBRIDGE: I was speaking more particularly as to our annual Exhibition at Toronto. Looking at the fruit myself last night and to-day I saw numbers of people that were asking what the different varieties were. Fruit grown in one district is so different to what is grown in another district, although it is the same variety, it is difficult often for a person to tell what the fruit is, and if this Exhibition Association would have cards printed and put on them and just laid loosely on top of the boxes and barrels it would be very instructive to the public.

MR. JONES: That would be a good point. Our own Executive can attend to that matter. However, with regard to the County Fairs throughout the Province, as it is at present, nearly all packages and barrels shown are named, necessarily so, or the judges could not act.

THE CHAIRMAN: Just at this point it would be interesting to have the report of the committee, and I will ask Mr. Macoun, of Ottawa, to give it.

STANDARDS FOR JUDGING FRUITS, APPROVED BY THE ONTARIO FRUIT GROWERS' ASSOCIATION FOR TRIAL IN THE YEAR 1911.

W. T. MACOUN, OTTAWA.

The following is the report of the Committee on Standards for Fruit Judging:

APPLES AND PEARS.

Single Plates:	
Form	15
Size	15
Colour	25
Uniformity	25
Freedom from Blemish	20
	100

PEACHES.

Single Plates:	
Form	15
Size	20
Colour	25
Uniformity	20
Freedom from Blemish	20
	100

PLUMS.

Single Plates:

Form	10
Size	25
Colour	15
Uniformity	25
Freedom from Blemish	25
	100

CHERRIES.

Single Plates:

Form	10
Size	20
Colour	20
Uniformity	25
Freedom from Blemish	25
	100

SEEDLINGS AND "ANY OTHER VARIETY."

Single Plates:

Form	15
Size	15
Colour	20
Uniformity	10
Freedom from Blemish	10
Quality and Texture	25
Season	5
	100

GRAPES.

Single Plates:

Form of Bunch	10
Size of Bunch	15
Size of Berry	10
Colour	10
Bloom	5
Freedom from Blemish	20
Quality	25
Firmness	5
	100

COLLECTIONS OF APPLES, PEARS, PLUMS, PEACHES, CHERRIES AND GRAPES.

On Plates:

Form	10
Size	10
Colour	15
Uniformity	10
Freedom from Blemish	20
Quality	10
Commercial Value	10
Nomenclature	5
Arrangement	5
Season	5
	100

BARRELS: APPLES.

Fruit:

Size	10	
Colour	20	
Uniformity	15	
Freedom from Blemish	15	
Texture and Flavour	15	
	—	75

Package:

Material	4	
Finishing	6	
	—	10

Packing:

Facing	6	
Tailing	2	
Racking	3	
Pressing	4	
	—	15
		100

BOXES: APPLES, PEARS, PEACHES.

Fruit:

Size	10	
Colour	20	
Uniformity	15	
Freedom from Blemish	15	
Texture and Flavour	15	
	—	75

Package and Packing:

Material	3	
Finishing	4	
Fulness or Bulge	4	
Solidity or Compactness	5	
Attractiveness and Style of Pack	5	
Alignment	4	
	—	25
		100

EXPLANATION OF TERMS—FRUIT.

Arrangement. Taste and skill in staging so as to attract attention and add to the general appearance of the exhibit.

Colour. Bright, clear, well developed colour, characteristic of the variety.

Commercial Value. Standard, known market varieties, as grown in and suited to the district, preferred.

Form. In all cases, except seedlings, refers to the normal type or shape of the variety, but in the case of seedlings it refers to shape as desired in a commercial variety. A roundish apple is of the most desirable shape, and oblate and oblong apples least desirable.

Freedom from Blemish. Any injury by insects, fungus, bruises, loss of stem, or other cause, lessening the value or appearance of the exhibit shall be called a blemish.

Nomenclature. Exhibits must be correctly named according to the nomenclature adopted by the Society, Association or Exhibition at which they are shown. The use of the standard of nomenclature adopted by the American Pomological Society is recommended to such bodies.

Polishing. Fruit on exhibition shall have as much of the natural bloom as possible. Judges should discourage polishing.

Quality and Texture. To be considered in collections, seedlings, new varieties on trial, or other sorts in competition.

Season. In collections it is desirable to have as long a season as possible represented by the varieties shown. Varieties past condition shown for the purpose of lengthening the season will not, however, score as high as apples in condition though of later season.

Size. While size in some cases indicates care and skill in production, it is not usually found with the highest color and with freedom from blemishes and as large size is not as important as high color and freedom from blemishes, the largest fruit should not take the first prize unless it is equal or better in other respects than those in competition with it.

Uniformity. Specimens should be as nearly alike in size, form and color as possible.

Explanation of Terms—Packing and Packages.

Alignment. Alignment refers to the rows of fruit in the box—the straighter and more regular the rows the better is the alignment.

Attractiveness and Style of Pack. When the box is opened the fruit should look attractive. The skill and good taste of the packer is shown in the appearance of the fruit and the style of the pack. There are many styles of pack, but the one should be used which lends itself best to the variety and size of fruit packed. The diagonal pack with solid sides is preferred. The fruit should be as nearly alike in size and color as possible. The box also should be clean and attractive looking.

Bulge. A bulge or swell in the top row of fruit is necessary in order to ensure the fruit carrying well. Before the top is put on there should be a bulge of one and one-half inches in the centre of the top row and the fruit should be one-quarter of an inch above the top of the box at the ends. When the cover is on there should be a bulge of three-quarters of an inch at the centre, at both top and bottom.

Facing. When facing a barrel, or when beginning to pack a barrel, the apples for the first row should be put carefully in with the stem end down, the stems having been first cut off so that they will not injure the fruit when pressed. If slightly smaller apples are used in the outside rows and larger ones in the centres it improves the appearance of the face. A second row is now put in, in the same manner as the first, and these apples should be arranged so they will show through the spaces between those in the first row. These two rows constitute the face of the barrel. The fruit used for the face should fairly represent the fruit throughout the barrel, but the apples in these two rows should present as attractive an appearance as possible. The law in regard to facing, as defined in the Inspection and Sales Act, is as follows: "No person shall sell or offer, expose, or have in his possession for sale any fruit packed in any package in which the faced or shown

surface gives a false representation of the contents of such package, and it shall be considered a false representation when more than fifteen per centum of such fruit is substantially smaller in size than, or inferior in grade to, or different in variety from, the faced or shown surface of such package." Apples in barrels for exhibition should be packed as required by law.

Finishing. By finishing is meant the heading, lining, cleating and marking of the box or barrel. The heads of the barrel should fit snugly into the chine. For barrels, six rosined nails in each head are usually sufficient. They should be skillfully driven through them and through the top or bottom into the ends of the box. The sides of the boxes should be nailed with four nails at each end of each side of the box. The nails used should not be smaller than those known as five-penny.

Marking. The marking of barrels and boxes should be distinct and attractive. It should comply with the regulations of the Inspection and Sales Act, which call for the initials of the Christian names of the packer, his surname, and his address; the name of the variety of fruit, and the designation of the grade, whether it be "Fancy," "No. 1," "No. 2," or "No. 3." Such mark may be accompanied by any other designation of grade or brand if that designation or brand is not inconsistent with, or marked more conspicuously than, the one of the said four marks which is used on the said package.

Material for Barrels. The standard barrel must be large enough to contain at least 96 quarts of fruit. Smaller barrels should not be exhibited. The barrel in general use in Ontario has staves 30 inches in length. In Nova Scotia the staves are 28 inches long. The dimensions called for in a standard barrel of minimum size are: Between heads, 26½ inches wide, inside measurement; head diameter, 17 inches, inside measurement; middle diameter, 18½ inches, inside measurement. The barrel generally used in Ontario is 27½ inches between the heads, 17 inches in diameter at the head, and with a middle diameter at the bilge of 19½ inches. A good barrel should have sixteen staves with 9-16 jointing, cut five to two inches and averaging four inches in width at the bilge, and be free from large knots or shakes. The head should not be less than one-half an inch in thickness, dressed clean and sound. The hoops should be about one and three-eighths inches in width and eight in number. The barrel should be new and clean.

Material for Boxes. The box should be made of material strong enough to withstand handling in transportation. The heads or end pieces should be each of one piece of wood and not less than three-quarters of an inch thick. The sides also should be each of one piece and not less than three-eighths of an inch thick. The top and bottom boards may be of one or two pieces, preferably two, but not more than one-quarter of an inch in thickness. They must be thin, so that they will bend readily when the box is closed. There should be two cleats each for the top and bottom. Dovetailed boxes are not desirable. The standard box must be used. This is 10 inches deep, 11 inches wide, and 20 inches long, inside measurement.

Pressing. Apples are often over-pressed. If the barrel is racked well there need not be much pressing. The proportion of fruit that is injured by pressing will be evident when the barrel is opened. The less fruit that has been injured by pressing the better the barrel has been packed, provided, always, that the pressing given has been sufficient to scure the required firmness. Barrels loosely packed frequently show more injury to the fruit through shaking than barrels over-pressed.

Racking. All barrels of apples should be racked when being packed, so that

the fruit will settle, and the packer thus be able to tail his barrel so that the fruit will carry well. When the barrel is opened the fulness or slackness will indicate how well the fruit has been racked. Over-pressed fruit is usually found when apples have not been racked well.

Solidity. This may also be expressed by the terms firmness and compactness. The more solid the pack the better the fruit will carry.

Tailing. By tailing is meant the putting and placing of the last fruit into the barrel. All that is necessary in good tailing is to have the surface as level as possible with the stem end down when the apples are pressed. The care in tailing will be known when the barrel is open by the manner in which the fruit has been bruised when pressing.

Q.—Why do you give marks for quality in plums and cherries and not in apples?

Mr. Macoun: The reason for that is in plums and cherries there are comparatively few seedlings which are shown, and we thought it better to use only one score card for those, and use quality. In all score cards except the one in Nova Scotia, quality has been included. We include quality in this because in the case of plums, for instance, where you have a comparatively small collection you can test the quality, and the same with the cherries. There are a large quantity on the plates, and there is not the same competition as a rule as with apples and the other fruits.

Q.—Don't you think the percentage of tails is an important matter? You spoke of 2 per cent. Mr. McNeill emphasizes it as a very important part in the packing of the barrel?

Mr. Dempsey: The tailing of the barrel is very expensive, and that is not the part we put up to sell the barrel. A barrel tailed to carry well to any market, the apples should be put in so they will be level, no matter whether they are on their sides, tail up, or heads up. Mostly we think that percentage is sufficient. The face of the barrel is the most important part, how the face is put in, and then the apples through the barrel should be the same. The tail is simply where we press it in and we shouldn't have to put on so much expense or take so much time in tailing up the fruit.

Mr. Wallbridge: If the tailing is right your face is more apt to be right. I think you ought to give more points to the tail because of the way it brings out the face.

Mr. Dempsey: Not at all. You can get a man to get that tail level for much less money than you can have a man make the tail look exactly like the face.

Q.—Don't you mean both tail and face?

Mr. Dempsey: No. If you are going to give a lot of points for the tail then the tail must be equal to the face, and that is the point we want to discourage.

Q.—According to Mr. McNeill's statement it was as important?

Mr. Dempsey: Well, I am speaking from practical work for a great many years in my own business as a grower and we have to pay more money to get a man to do fancy tailing than we do for fancy facing. It is easier to get a fancy face than it is a fancy tail, and why should we encourage tailing? It is not the tailing that sells the barrel.

Q.—Are you speaking of the English market?

Mr. Dempsey: I think that would apply to all markets.

Mr. Lick: When you go to the Western market you must pay more attention to the tailing. We have had to change our method for the Western market.

MR. DEMPSEY: I have been putting up my apples for Chicago.

Q.—What is the reason that they require it different in the West?

MR. JONES: They have gone a little crazy in the Chicago market with regard to tailing a barrel anyway. I had some packers only a year or two ago from Chicago, and they hadn't packed anything but Ben Davis, and they tailed them on their sides and pressed them down about three inches and a half, and when they got through I would have wanted about $1.50 off for demurrage on those barrels. There was nothing left but the face and probably six inches of apples below the face, and the rest of the barrel was bruised. The tail being so heavily pressed in and being on its side, the apple hasn't the same resistance as it has on its stem end, and those apples on the tail were completely ruined. Now, those men were considered to be expert packers and they knew actually nothing about packing a snow apple. They ruined a lot of apples, a matter of some 600 barrels, and I wouldn't have taken them back off their hands at 50 cents a barrel after they were done. They spent a lot of money at that work, too. Those men were in there at $2 a day and they spent a lot of time on that tailing, and just ruined the apples. Don't go and press it and have your fruit packed so that it will show pressure more than three apples back from the tail. It will travel from here to the north of Scotland or to the other end of Alberta, and there will be no scars.

MR. DEMPSEY: I would like to give a little instance of what we have had to contend with in the last three or four years in connection with the Northumberland and Durham exhibit. We had some apples packed up by some of the best packers in our section this year and they came up for exhibition, and I am sorry to say there were a great many of those barrels we couldn't use at all, simply because they had been filled right up full and pressed, and there were only two or three apples at the face we could use. There were other barrels put up by the growers that were barely filled and very slightly pressed, and every apple of those barrels has gone into the exhibition. I don't know why we should have those barrels tailed so much and pressed down that way to go any place. It certainly destroys them.

A MEMBER: That is all right to send as far as Toronto.

MR. DEMPSEY: They will carry to the Old Country with much less tailing and pressing than the buyers are doing.

MR. SMITH: I think Mr. Dempsey's argument is a good one. Are you going to put as much value on the tail end as the face? It seems to me the face end is what is looked on in the market and what it is sold by, and it is the end that has the most importance, and it ought to have more marks. I don't want to enter into any argument or criticism, but there is a point worth considering. It seems to me it is necessary to have a score card fixed up by experts, something you can go by. There is one thing that struck me as being very important to us if we go into a National Apple Show, if we have to compete with British Columbia, for instance. We in Ontario would adopt that score card and there are no points for flavor, and flavor is one point particularly that we excel in in Ontario, and if British Columbia or Washington or Oregon comes into competition with us and no points for flavor we will fall down. Of course I can see good reason for leaving it out in competitions in our own Province. We could, of course, adopt a new score card for national apple shows, but we would have this precedent before us.

MR. DEMPSEY: I think Mr. Smith is under a misapprehension. In plates, say, of all Kings or all Baldwins or all Spies, that is the only place the quality is left out.

MR. SMITH: There would be plate competition, I suppose, in a National Apple Show as well as barrel and boxes, and I think we would fall down before the Western men.

MR. MCNEILL: In the case of a National Exhibition I think we would need a special score card for that show. We don't need the quality points where we have the show in Ontario.

MR. MACOUN: I move the adoption of the report.

MR. JONES: I second the motion.

MR. MACOUN: Before that resolution is put to the meeting there is something in what has been said about it being impossible for this meeting to go over all the points. I should suggest that this meeting adopt it for this year. It will only be a small cost to have 10,000 printed, and then next year we can go over the score card again and revise it in any way the Association thinks fit. My idea would be to have a small card for Eastern Canada, and I don't think it would require much change to have it for all of Canada.

Q.—Is there anything in the report as to whether the apple is to be polished or left with the bloom on it?

MR. MACOUN: There is nothing in the score card referring to whether the apple should be polished or not, but in the explanation given there will be something of that character. In Association shows all fruit is polished. I myself do not believe in that except perhaps for barreled and boxed fruit. For plate fruit I think it is better not polished.

MR. SMITH: I think it is a good idea to adopt this for one year and have copies printed. and another year we will be prepared to criticize it.

The Chairman put the motion, which on a vote having been taken, was declared carried.

MR. JONES: I have a motion to present. I move that a sufficient number of copies of this report be printed by this Association and be sent to the Fair Boards and the Agricultural Societies, and the district representatives, and the colleges and experimental societies for use next fall at the fall exhibitions, with a circular letter, and that a copy of this report be slipped into each prize list when they are mailing them out in the fall of the year to their prospective exhibitors, and also that a copy of this report be handed to each judge as he goes to perform his duties in the fall at the local fairs.

MR. SMITH: Why could you not say that without adopting this absolutely as the guide of this Association? The only reason for not adopting it absolutely is that which I spoke of before, that if we should have a national apple show within a year, although you might change the score card for that purpose, yet it might be thrown up to us that we have a score card for Ontario and you don't use your own score card.

MR. MACOUN: If this Association would authorize the printing of a sufficient number it might be a good idea. The thing will cost very little and I think there will be a sufficient number of copies printed to get it well distributed.

MR. DEMPSEY: I second Mr. Jones' motion.

The Chairman put the motion, which, on a vote being taken, was declared carried.

MR. JONES: Referring back to another motion in reference to what Mr. Wallbridge said, I might move that this Association provide name cards for all boxes and barrels and packages for the Ontario Horticultural Exhibition next year.

The motion was duly seconded, and on a vote being taken was declared carried.

WHAT IS THE MATTER WITH CO-OPERATION?

S. E. Todd, Petrolea.

If I were a poet or a musician I would try and work out a parody on "What is the Matter with Father? He's all right." "What is the matter with co-operation? It's all right." Co-operation, I think, is really the answer to the great question of how to produce and market our fruit properly, but in order that we shall be able to co-operate properly we must understand what co-operation means. If there is anything wrong with co-operation it is with the people who are in business, not with the principle itself.

There is no doubt about it, because it has been proved in so many countries in the world to be a perfect success. This idea of co-operation is no experiment. In the countries of Denmark, Germany, England, Ireland, France, Switzerland, and Italy co-operation has proved itself to be able to answer whatever problem it has been put up against, and it has been put up against a great number of problems, and a great variety of problems. In Denmark it has been applied to the question of marketing the farmers' products. In Germany it has been applied to the question of supplying the farmers with cheap credit. It has become his bank account, his means of getting credit with which to perform his work, and to get capital to carry on his business. It has freed him from the Jew money leader who was there and who was exacting tremendous interest from him, simply by getting together and working together as a co-operative body.

In France it has been applied to the business of producing. Over in France there are co-operative vintries and co-operative dairies, a number of farmers joining together and producing together. While that is so, it seems to me in Denmark that conditions more nearly resemble ours than they do anywhere else, and it is from Denmark we can learn the greatest lessons. Over there they have organized their industries in such a way as to bring them greater returns for their outlay. Denmark has had the same trouble that the people of this country have had and are having all along, and that is to get adequate returns for their effort. Their problem has been one of marketing just as ours has, and wherever co-operation has attacked the question of marketing there it seems to be most eminently essential, and it is the consensus of opinion of a great number of men who have been engaged in this for 30 or 40 years, that the main thing which co-operation is able to do is to answer the question of marketing.

When the farmer and the fruit grower is provided with an adequate market, when he sees if he produces, and produces any quantity, that that is going to bring him a market which will fulfil all that he needs and will give him expansion and that will allow him to go on and produce more and more with perfect confidence, then he is able to go ahead. It seems to me that the answer to the question that has been asked time and time again of the farmer of Ontario is why he is not producing more? That is the question that seems to be large in the minds of a great many people in Canada and the United States to-day. Why is the Ontario farmer not producing more? The answer generally is that the markets are not in a condition to give him returns for that product, not that the produce is not dear enough, but that he is not receiving the benefit he should receive from that high price, and co-operation seems to be the way to give him that market.

Now, I believe I am to talk about the question of why failures have occurred in the co-operation system. I will not go further into this other subject, because I want to get right into that. I think the chief thing that is wrong, and the rea-

son we have had more failures than in any other thing, is simply that we do not understand what co-operation means, nor the principles involved.

Every country in Europe that has been successful in the co-operation effort has had what they call a central organizing body. This body is a small association whose business it is to go through the country and organize co-operation associations. They start in by studying what has been done in all the other countries. With that knowledge then they are ready to go into a new section of country and organize it, with the experience gained by other countries.

The principal problems which they have to attack are of course different in the different countries because their business is to organize, and they have to study just how it is done. The mistake which is made in organizing one society is not made in organizing the next society, and so by means of this central organizing body they are able to go on from one success to another, till they work out a system that is peculiarly adaptable to the country in which they are working. This is the only way, I may say, that co-operation has been successful in any country, that is, through a central organizing body whose business it is to organize individual societies. The work of that body is to organize societies, to advise how managers shall be paid, and to settle disputes. They have those three main points to look after and these three are of very great interest.

Q.—What control has this central organization over the other? Has it power to make changes in the smaller bodies?

Mr. Todd: That all depends on the Legislature in the country in which it is. In some countries, take, for instance, France, small societies can only be organized through the central. That is, small societies are only recognized as co-operation societies when organized through the central Association. In Denmark this is not followed, because they have worked out there a universal plan and they never think of organizing except along certain lines. Just at this point there is a question comes up. You go to a man in Denmark and you ask him what about a man withdrawing from those societies, and he will tell you no one ever withdraws there; they never think of such a thing. The whole success of their country is bound up with the co-operation system of manufacturing and marketing their products.

Now, the fact that there is in this country no central organizing body had led to a great diversity of associations of every kind and description, and every person who wishes to organize what they call a co-operation society can go in and do so. It may be co-operation or it may not. The people of Europe, in fact all the countries of Europe, have agreed on certain things that they lay down as co-operative principles, and they do not recognize anything else as co-operative. If they have a society requiring capital they have two forms. One is for the whole association as an association to go in and borrow the money with unlimited liability, each person going in for the whole amount of the liability of the association—that is the most popular method; or, on the other hand, they have a share system as we have in this country, but they have changed that share system from the way it is commonly used in joint stock companies. The share system as used by co-operation societies has two differences, and one is that no matter how many shares a man may own in the Association he has only one vote, and so can never gain control of the society. Then the dividend paid on the shares held in an Association is always fixed so that it amounts to interest on the money which is invested in the Association in the form of shares.

This lack of a central organizing body has led to all the other mistakes which

our associations are also plagued with and that have caused so many failures. We have no general body and there has not been gathered from the mistakes of others the experience with which to go on and form more successful associations. Each association is working separately and blindly, and for that reason the co-operation associations of this country have not made nearly the headway they should have made, or would have made, if they had proper and skilful direction.

MR. PATTISON: Don't you think one of the chief reasons in addition to what you have pointed out is that the spirit of the people in this country is totally different from the spirit in those other countries? The people here largely are too individualistic, too selfish, too disinclined to make any sacrifice for the benefit of others? In other words there is a spirit of mutual distrust instead of mutual faith, which is largely absent in the countries you have mentioned?

MR. TODD: I think probably human nature is not different in one country to what it is in another. Human nature is pretty nearly the same everywhere. If there is a difference it is a difference of education. Let us go into the history of the formation of co-operation societies in other lands. In Denmark in 1854 there were probably no more individualistic people anywhere. The English farmer has been noted for centuries as being individualistic, and to-day he is recognizing the value of co-operation. The Irish farmer has always been known to be "agin the Government," and everything else that had anything to do with working together. They were always afraid some one was going to skin them, and they got skinned a good many times because they were afraid. Yet in Ireland things are entirely changed, mainly through the work of Sir Maurice Plunkett, who has spent his life in doing that.

Q.—What remedy do you suggest?

MR. TODD: I think there is probably only one way out of it, and that is by some means to get a central organizing body. To suggest how that shall be done is beyond me at the present time, for I may say I am a little too young in the business, and I think that will have to be worked out through the combined ideas of the men who are in the co-operative work. What I am doing at present is pointing out what has made the success there, and what has caused a great deal of the failure that we have had.

Q.—Would you not have to get some legal standing for the central committee?

MR. TODD: Yes, we would. That is one of the things we lack in Ontario.

Now, coming down to some of the individual reasons why our associations have failed. One of the things that strikes a person who goes over to Denmark, for instance, is the business methods with which the farmers of the country are imbued. Each farmer has an exact record of what his farm is producing. He knows exactly what is being done on that farm. The co-operation societies there all issue a form of bookkeeping which each member of the society is expected to carry out all the time, and they employ expert accountants who go from place to place. They are experts in the cost of production, and they point out where the cost of production has been too high and where they could succeed very well somewhere else, and so on all the way through. These men travel through the country and are in the employ of the co-operation societies and partly of the Government. These business methods in which the people are trained aids them in dealing with the co-operation society. They recognize just what their own living is worth; they recognize what it costs to run a business, and they recognize that you cannot get anything without paying for it.

Now, that brings up the question of running a society in this country. One

of the great reasons why we have failed; I think, taking individual reasons, is that we have never learned as farmers that it costs money, and just exactly what it does cost to run anything. We start a society and we pay say five cents a barrel for packing apples and it amounts to about six or seven hundred dollars, or three or four hundred dollars for the man who is handling it, and we expect him to spend the biggest part of his time running the society for that much money. We have not had sufficient training in business to know what it costs to run an association and the expenditure necessary in handling that Association, and we are not prepared to pay a good man a good thing in order to get his services. I think that is one of the great difficulties. You can't get any thing without paying for it, and in order to make a success of anything we have got to have brains behind it, and if you are going to have brains behind it you have got to pay for it, and in order to get a good manager you have got to pay him a good thing no matter who he is or what his business is. On the other hand there is a point where the manager's salary should stop, and every society should know exactly what their manager is getting. If he is being paid by commission they should know exactly what he is getting.

It has been said that perhaps the greatest cause of trouble in an association is jealousy. That probably is true, but jealousy is caused by suspicion, and suspicion is caused by ignorance. If we had more knowledge of what the whole system is doing, if every three months all the transactions were laid before the society, that would be a great means of disarming jealousy caused by the ignorance of the members of what has been done in the society. Another cause of our troubles has been the quality of the goods. The quality has often not been what it should have been. We place a brand on the goods that go out and that brand becomes the standard of what the society is putting up. If you are putting up a good article it is going to give your brand a good name, and if a poor article it is going to give the brand a poor name. That is absolutely certain, and that is one of the things that every society must recognize. In dealing with the causes of failure, as I have been going through the country and trying to find out from those societies that have failed, I have found that one of the greatest causes is that the quality has not been what it should have been at all, and the brand itself got a bad name and of course then the society had to die.

Another trouble has been the forms of organization under which we have labored. We have had joint stock companies formed who have called themselves co-operation societies, when they were anything but co-operative. A few members owned the biggest part of the stock, and the great bulk of the results was going to a few. That has been a very general cause of trouble. Then there are two kinds of societies very often within one, selling societies and buying societies. An Association will have two ends to it. It will pack and sell the man's product, and on the other hand it will buy. Now, unless those two businesses are kept absolutely separate there is sure to be a mix up. If the manager is selling on commission, the members will generally think he is getting too much commission. The plan that has worked out best in the European countries has been separate societies for each of these purposes. The members, of course, will be the same, the manager may be the same, but the Board of Directors will be different, and the President and Secretary will be different. This has been found the only way over there of handling the thing to good advantage.

Now, about this question of jealousy. In talking to one man this forenoon he told me that perhaps the biggest trouble that there was in co-operation societies was

the question of jealousy between the members. We can go on and preach and preach for all we are worth that men ought to love one another, and not be jealous of one another, and not be suspicious of one another, but the way I think to get over that trouble is to disarm suspicion by running the business in such a way that every dollar's worth of business done shall appear before the members so that they will have nothing to talk about. If a society is paying their manager on a commission basis then every dollar's worth of goods sold and the commission on that should appear in the statement so that the members would know right along just exactly what the manager is getting. If he is selling apples on commission every dollar's worth that he sells should appear, and should appear often enough so that they would know exactly what he is getting. There is nothing that would disarm suspicion and would throw down jealousy so hard as a system of that kind. There would be no room for jealousy because every one would know exactly what they were doing.

Q.—I understand in Alberta the Government built a creamery building and they receive the milk and sell the product?

Mr. Todd: Alberta is a section of municipal ownership, which is a different thing. That is where the whole country is a co-operative society. The co-operation idea as it is generally understood is confined to members only. Whether that will be a success or not is hard to say. It is still in the experimental stage. I have been trying to find a parallel in some of the older countries and I have not yet done so. New Zealand, I think, has the nearest approach to the Alberta system of anything I know. They have been running there something on the same plan and are more or less successful, but the plan that seems now to be more successful in New Zealand is the co-operation society, and they have carried it to such perfection that they have confederations of their societies which have agencies in London, England, and there they sell all their products directly to the consumer or to the small markets in London, England. Now, they handle butter, eggs, hides and so on, and also do a banking business for the farmers in New Zealand.

A Member: The gentleman who spoke just before is mistaken in supposing that the Government builds the creameries in Alberta. The Associations which are organized build the creameries and pay for them. The Government is at present running a few of the creameries. They rent the creameries from the owners or the farmers that built them and run them for a time. The idea is to put them on their feet until they get the confidence of the people.

A Member: The idea being, I suppose, as soon as they are self-supporting then they will go back to the owners.

A Member: I don't know what the idea is of the Government of Alberta at the present time, but I know that was the idea of the Dominion Government when they were operated by the Department of Agriculture.

Mr. Peart: I have been very much pleased with the address by Mr. Todd. In regard to the principle of co-operation as applied to handling apples I think he has struck the nail on the head when he said that one of the causes of failure is in not securing a competent manager. There is no doubt if you want to get a good man you have got to pay a good price. I am a member of an association which is about twenty-five years of age, at Burlington, and we call it a co-operative association. We ship apples and pears, and we have been doing business continuously for a quarter of a century. We engaged a competent manager, and under our system each member of the association packs his own fruit. He packs under general rules that are laid down by our association, and it is supposed to come up to that stand-

ard. Now, the great beauty in our association is that each man is paid for his own stuff. As I understand it, in the standard Co-operative Apple Associations the results are poor. For instance the chairman and I may each send ten barrels of No. 1 Spies in a car to some point. His ten barrels of Spies are No. 1's but of a higher degree of No. 1 than mine. All of you who know anything about the peculiarities of the Northern Spy know that there are a great many degrees in a No. 1 apple. Now, his apples are a degree or two better than mine, and yet when it comes to pooling the price he is given a price the same as my inferior No. 1's. I consider that is a weakness. But I just wish to bring forward the fact that under our system there is no dissatisfaction among the members in regard to the price they get. The more brains, the more capital, the more labor I put on my apples and pears the better results and the better prices I get and I reap the results of my own work.

MR. BUCHANAN (Beamsville): Perhaps the best way I can begin is to give some of the circumstances under which we organized, as it will throw some light on some of the points that Mr. Todd has so well set forth. We organized down there in Western Ontario, and when we commenced to organize it was perfectly plain that there were two classes of fruit growers in the peninsula. In the first place there were a small number of men who were growing fruit and who were business men or retired professional men. The business men as a rule did not know very much about fruit farming. On the other hand there were a large number of fruit growers who were very good farmers, but who did not know very much about business. Unfortunately a very large number of farmers think they know a whole lot about business. They think because they can send out quotations, and because they can draw drafts on their customers, and discount a note in the bank, and so on, that they are acquainted with all the intricacies of business. For myself, I know very well I don't know anything at all about business, and we people who organized got the idea into our heads that it was necessary for us to hire a man to do our business in the same way as we hire a solicitor or a doctor. It is perfectly clear that no man who employs a solicitor will have any success if he assumes he knows as much about law as the solicitor and tries to bring his knowledge of the law into the case; and in a similar way if farmers get together into a co-operation association they must definitely make up their minds that their manager whom they have hired is a business expert, and they can have no idea if the means he adopts in carrying on business is the best way or not. They must, of course, have a Board of Directors, but they must on the whole leave things to their manager, and it is necessary that he should be an expert business man, and he must be a sort of prime minister. That was one point that we held as essential. We also held that a co-operation association to be a success must be large one. There are a great many reasons for that, such as the fact that unless it is large it cannot be influential enough to make its weight felt with the railways and the Railway Commission and a great many other organizations. But those reasons are really side issues. The real reason why a company must be large is that they must be powerful enough to hire the best business expert they can get. A small association of ten or twenty or thirty members cannot do that. For example, if we were paying our manager the same rate per individual that some of the smaller associations are paying their manager we would be paying him something like $10,000 a year. We are paying him a very good salary, but very much less than that. We organized our Association with a great deal of difficulty on account of the Canadian law. Mr. Todd has alluded to the fact that there is no Canadian law for co-operation associations. I was

one of the unfortunates who was on the committee of organizations, and it looked to me as if it was something like that old game of bagatelle where you shoot a ball through a lot of pins, and every time we got through one pair of pins there was another pin stuck up that we had to get around also. We organized as a joint stock company with a Dominion charter, and we had a great deal of difficulty in getting our charter through the Department. We found there were rulings to this effect and rulings to that effect that made it almost impossible to get a co-operation association.

MR. TODD: May I ask how much business you did?

MR. BUCHANAN: If it had been in carloads it would have amounted to 400 carloads.

MR. TODD: In dollars, roughly?

MR. BUCHANAN: I couldn't say exactly. It would be $200,000 anyway. You can figure that from the carloads.

We got our charter and our company was organized first of all in local associations. At each shipping point there is a semi-independent local association. with its own chairman and secretary, to carry on such of its local affairs as it sees fit. The whole company is co-ordinated under one Board of Directors elected by the shareholders at large, but our charter is so drawn that each separate part of the Province can elect its own directors quite aside from another part of the country. We also arranged that each local association should contribute one member to the Price Committee. Our object in that was this, that the Price Committee is a very important part of the company, and we purposed in making that arrangement that our Board of Directors would be elected from amongst our strictly business men quite irrespective of their knowledge of farming. On the other hand, we arranged that each local association should be able to send a competent farmer to act on the Price Committee. Now, that organization has been found to work very well this year. We have had very little friction. The principal difficulties we have had in our company this year were of a clerical nature, probably because we have done double the business that we expected to do. In other words, our expert staff in the office has been simply swamped all summer. Our company, as I said, has been organized on a co-operation basis. That is to say, no matter how many shares a member has, he has only one vote, and although it is a joint stock company, there has been no such thing in it as any promotion stock. We think under the present Canadian law that is about the only way an association can be formed.

MR. TODD: As a joint stock company?

MR. BUCHANAN: Yes. We consulted a very eminent firm of solicitors who got our charter out for us and smoothed away a great many of our difficulties. There is just one point I would like to mention. Mr. Todd said the lack of business ability had a great deal to do with the failures of associations. My opinion is most co-operation societies fail on account of their system of accounts. We put our accounting affairs into the hands of chartered accountants from the very start. I will be very happy to comply with your suggestion.

MR. TODD: There are three points in connection with co-operation societies. First of all be sure that you have the right form of charter, then get a good manager, and do everything on a business basis. If that is done nearly all the jealousy will disappear. If it is conducted on business lines I do not see why it cannot succeed the same as any other business.

THE PRESIDENT: The Committee appointed to deal with the tariff question have sent in their recommendation. It is moved by Mr. Albert Thompson, and

seconded by Mr. E. Lick, that the following names go upon that Committee: A. Onslow, Niagara; J. W. Smith, Winona; A. W. Peart, Burlington; R. Thompson, St. Catharines; H. Jones, Maitland; W. H. Dempsey, Trenton; E. D. Smith, Winona; D. Johnson, Forest; R. W. Grierson, Oshawa. These are the names of the members of the Committee to deal with the tariff question. The President put the motion which, on a vote being taken, was declared carried.

SHIPPING PEACHES TO GREAT BRITAIN.

C. A. Dobson, Hamilton.

In the fall of 1909 a few gentlemen accompanied me down to a farm that I have coming into bearing at Jordan Harbor. They had just recently returned from England after a short visit and they admired the fruit on the trees and passed the remark: "Now, if you could only ship some of that fruit to the gentleman we have visited in England, we think we would be kind of squaring ourselves." However, as the undertaking seemed to be rather an expensive proposition at that time I didn't think seriously of it then. I had in mind previous to this sending a few packages over to my personal friends there, as they were the first peaches that came off the orchard, and I made a proposition to these gentlemen, and said, "I will prepare a certain number of packages along with my own, and I will send over to our agent at Liverpool and write him asking him how to despatch them from Liverpool to the respective places." The destinations were London, Liverpool, Bristol, Manchester, and Glasgow; in all we forwarded some sixty crates packed after the Georgia style. These crates had capacity equal to eleven quart baskets, or 120 peaches each. We picked them very carefully, wrapped them, and got the best color we could. These were shipped, and in every instance we had the most glowing and flattering expressions, and they were astonished and amazed to think that we had such fruit in Canada, especially Ontario. One gentleman immediately wrote back and said he wanted me to set aside twenty packages for his own personal use and his neighbors and friends. That is equivalent to forty baskets. Towards the Christmas season a gentleman from London called into my office at Hamilton, so I raised the question with him about the peaches, and the possibilities of the market there. He seemed to look very favorably on the outlook, and I asked him when he went back to put me in touch with a first-class firm with whom I could take the matter up thoroughly, and he sent me the name of Parsons & Company. They wanted nothing but a white peach in the Old Country, they said, and Parsons seemed to have the idea that we had nothing but a yellow-fleshed peach here. However, I told them our peaches were not exactly yellow.

Our experimental shipments to our friends led us to believe that it would be advisable to adopt a different kind of packing or package, and we began to examine as to how these peaches arrived in London that were exported from South Africa, and finally, through the courtesy of Parsons & Company and the Agricultural Department, we had the privilege of examining one of these packages. Then I took up the question with Parsons & Company as to how many they could handle, and I asked them if they could handle one, two, or three thousand packages a week. I got their maximum and minimum prices for the South African peaches, and it occurred to me if we could get a few of their maximum in with their minimum prices we wouldn't mind making a test of it occasionally.

I laid my plans for giving them about a thousand packages a week, but owing to the fact that our peaches must arrive there in perfect condition, the size must be large, the color must be good, and the flavor must be right, the number was reduced.

We got the first shipment off by express from Jordan station to Montreal. When the fruit had been sealed up in the cold storage compartment of the boat I received a telegram the following day from the Dominion Inspector that the consignment was a little over ripe, and unfortunately the temperature of the fruit when being transferred from the express car to the steamer was found to be unreasonably high. However, the shipment went forward, and, to make a long story short, the price I received for that particular consignment, the average net price, was 95 cents per box. These boxes each contained from fifteen to twenty peaches. The next consignment, some 309 boxes, averaged $1.21 net. The next consignment of 529 boxes was $1.29 net. The next consignment of 600 boxes met with a little misfortune in the cold storage compartment, through the cold storage pipes leaking, and I can't say whether there will be a loss or not at the present time. These peaches were distributed in London, Liverpool, Manchester, Glasgow, Birmingham, Brussels, and Paris, so that all those cities have had a taste of Ontario-grown peaches.

Now, if you anticipate going into this business, bear this in mind, send nothing but A1 stock, and such that would only afford you pleasure to hand out to your dearest friends. They pay great attention to the size. Of the size we had at Jordan later in the season we could only force about fifteen into a box. The first two shipments consisted of Early Crawfords, and the later shipments were Elbertas. They say over there they must have a peach with lots of color and good size and some flavor attached to it, and if we send that kind we will get our money out of them.

Mr. Ruddick: Before I left Ottawa I was authorized by the Minister of Agriculture to arrange for another conference of fruit growers from all over Canada to take place next autumn at whatever time you thought would be best. Probably a week later than this, just after the fall meetings are over, would be a good time. I think it would be desirable for this Convention to appoint their delegates to that conference now, and set them at work on the subjects they are to discuss. I also intend to ask the delegates to this conference from this Province to prepare special exhibits of the leading varieties of apples from their respective districts. It need not be a very large exhibit, but probably a dozen varieties from each of the localities. Now, I may say for your guidance that it has been decided that the conference will be organized on the same basis as the last one, and that will give this Province nine delegates. There will also be the Department of Agriculture and the Ontario Agricultural College, as well as the others, asked to send delegates. This Association will be entitled to name nine delegates. As the time is so short I will not say anything further now. Probably anything more can be made a matter for correspondence with the delegates that are appointed.

The President: The chair will appoint Mr. Smith, Mr. Johnston and Mr. Jones to pick out the delegates for this meeting. They can bring in a report right away.

Mr. Robert Thompson: I see I have been asked to say a word or two on this. Last year in this room, when we were discussing the question about what was to be done, I think I was asked the question what, as fruit growers, we ought to do,

and my answer was I thought the Dominion Government ought to do something, the Ontario Government ought to do something, and the fruit growers ought to do something to help to send those experimental shipments through. The two Governments expressed their willingness, and an appropriation was secured. Along early in the spring, when the wild cat stories got about with reference to the peach crop, I met some of the gentlemen that were afraid we wouldn't be able to put those peaches in at a fair price. It was supposed to be at the market price, and it meant extra work and care in regard to them. I assured Mr. Ruddick that there would be no trouble, that they would get the peaches at St. Catharines, and we undertook to put up 2,000 boxes. Owing to the weather we were not able to put up quite so many. We had two weeks of bad weather this year, one week with Labor Day in it, and we had to put the peaches up on the first three days of the week to get them ready for the boat, and we had to work on Sunday there, as they had to in some other parts of the Province. Now, Mr. Moore and Mr. Ruddick, will give you the particulars, and I am not going to go into any details. Mr. Dobson said there were two sides to the question, and he, of course, took the rosy side. I am a grower, and I am not in the habit of taking the rosy side. I feel it is right to say that at the present time there is nothing that has made my indignation rise so much as to hear some of those men tell stories of what great profits were made, as we see in the papers. They do not say, on the other side, what the cost is to produce, and if we get seemingly a large amount out of it, we have got to a pay a great deal out which the public does not know about. I heard a gentleman sitting opposite me to-day saying, how are you going to reconcile the fact that the apple men are coining money? I said it isn't so. I said you have got to have an explanation of that. Now, for instance, the expenses of this meeting have to be taken into consideration in growing your fruit. All those things have to be taken into account, and that is the reason I don't want to say that because we have received a good price for those peaches it is going to pay us for all the extra trouble we have taken in regard to it. I am glad to say this though, that it was successful. We didn't expect we would come out ahead. I just wanted to say this for fear some of our growers would follow Mr. Dobson's example and think that each and every one could go and make shipments to the Old Country and be successful. It is only a large association with large bank accounts, or men like Mr. Dobson, that can handle that. We had some twenty odd growers that participated in sending this fruit into the packing house, and when you consider that we had to get excelsior to put into the packages, and take it out to the orchard, and then pick the peaches off the trees and select them and pack them so that no two peaches touched, and then take them out again and lay them to one side, and all that extra handling and care, you can see it requires a good deal of extra expense. I won't say much about the quality, because some varieties haven't much quality about them. The receipts are apparently high; on the other hand, the expenses are very great, and I think we have got a good deal yet to learn with regard to the varieties to send. I think we should get the assistance of the officers of the two Governments in trying to advertise the shipments to the Old Country, and help us out in that way at least. I think it is one of the best advertisements that Canada has ever received. I was amazed to read an article in a British Columbia magazine about the fact of the successful shipment of peaches to England, and it didn't say where they were from, and British Columbia got the same glory as we did.

COLD STORAGE FOR OCEAN SHIPMENTS OF FRUIT.

W. W. Moore, Ottawa.

The two previous speakers have told you about the shipping of peaches to Great Britain this season, but I want to impress upon you the fact that this export trade in tender fruits has been made possible only through the action of the Dominion Department of Agriculture in reserving cold storage space in the ocean steamers, which enabled a shipper to send one case or one hundred cases in cold storage at the regular rate of freight for cold storage goods.

Reservation of Cold Storage Chambers for Fruit Only.

On August 9th the Dairy and Cold Storage Commissioner sent out a notice to fruit shippers, stating that in order to assist in the establishment of an export trade in tender fruits and early apples, he had arranged with the steamship companies for the reservation of cold storage chambers for fruit only on steamers sailing from Montreal to Glasgow, Bristol, London and Liverpool, on the following dates:

To Glasgow—September 8th, 17th, 24th, and October 1st.
To Bristol—September 15th.
To London—September 17th, 24th, and October 1st.
To Liverpool—September 17th, 24th and October 1st.

The Department guaranteed a certain amount on one chamber on each of these steamers, and when the actual earnings fell short of the guarantee, the Department paid the difference.

In addition to the steamers referred to above, the Commissioner arranged for cold storage space for Mr. Dobson's shipments on the steamer *Tortona,* which sailed from Montreal to London on September 10th, and on the *Cairnrona,* which sailed on October 8th.

To illustrate the benefit conferred upon shippers by the policy of the Department in regard to this matter, I may say that when Mr. Dobson found he would have a shipment of peaches ready for the week ending September 10th, he endeavored to get cold storage accommodation, but was turned down by the steamship companies because he did not have a sufficient quantity to make it worth their while to open a chamber. He was, therefore, absolutely blocked, and appealed to us for help. We promptly took the matter up with the Robert Reford Co., and arranged for the necessary space in the *Tortona.*

Refrigerator Cars for Shipments of Fruit from the Niagara District to Montreal for Export.

The Commissioner also arranged with the Grand Trunk Railway Company to run one refrigerator car from St. Catharines on Wednesday of each week to connect with steamers sailing from Montreal September 17th, 24th, and October 1st. Only export fruit could be put in these cars. The Department guaranteed minimum carload earnings. plus icing charges, and shippers were charged the l.c.l. rates only. If the freight collected on each car fell short of the guarantee, the Department made good the deficit. A notice was sent to shippers at Grimsby, Vineland and Burlington that an iced car would be furnished them at any time on terms similar to the above, provided that not less than half a carload was shipped at one time.

In passing I might state that the St. Catharines car was run as per schedule, but that it carried little besides the Department's shipments of peaches. One car was shipped from Grimsby and one from Burlington.

CANADIAN PEACH SHIPMENTS, 1910,

The total quantity of Canadian peaches shipped to Great Britain during the season of 1910 was approximately as follows :—

Date shipped from Montreal.	Shipper.	Market.	No. Single Layer Cases.	Total Number Cases.
1910.	*1st Week.*			
Sept. 10	C. A. Dobson, Jordan Station.....	London	.....	600
	2nd Week.			
" 15	Dept. Agriculture, Ottawa.....	Bristol	50	.....
		Cardiff via Bristol	25	.....
		Birmingham	24	.....
	Total for Bristol and	District	99	.....
" 16	Dept. Agriculture, Ottawa.....	Liverpool	51	.....
		Leeds via Liverpool	12	.....
		Manchester "	12	.....
	Total for Liverpool	and District	75	.....
" 17	Dept. Agriculture, Ottawa.....	Glasgow.....	93	.....
" 17	" " "	London	150	.....
" 17	C. A. Dobson, Jordan Station	London	309	.....
	Total for 2nd	week.....	.....	726
	3rd Week.			
" 24	Dept. Agriculture, Ottawa	Liverpool	102	.....
		Leeds via Liverpool	24	.....
		Manchester via Liverpool.	24	.....
	Total for Liverpool	and District	150	.....
" 24	Dept. Agriculture, Ottawa	Glasgow.....	177	.....
" "	" " "	London	342	.....
" "	Biggs Fruit and Produce Co., Burlington	Liverpool.....	27	.....
" "	" " " " " "	Glasgow.....	68	.....
" "	" " " " " "	London	105	.....
" "	C. A. Dobson, Jordan Station	London	529	.....
	Total for 3rd	week.....		1,398
	4th Week.			
Sept 30....	Dept. Agriculture, Ottawa	London via Liverpool	198	
" 29....	Biggs Fruit & Produce Co., Burlington	Bristol	67	
Oct. 1.....	Biggs Fruit & Produce Co., Burlington	Glasgow.....	15	
" 1.....	C. A. Dobson, Jordan Station	London	600	
" 1.....	D. Johnson, Forest.....	London	9	
" 1.....	Miscellaneous.....	London.....	27	
	Total for 4th	week		916

CANADIAN PEACH SHIPMENT, 1910—Continued.

Date Shipped from Montreal.	Shipper.	Market.	No. Single Layer Cases.	Total Number Cases.
	5th Week.			
Oct. 8.....	C. A. Dobson.....	London.....	.....	19
	6th Week.			
" 15.....	C. A. Dobson.....	London.....	.....	84
	Total quantity	Shipped.....	.....	3,743

SUMMARY.

Shipped by Dept. Agriculture, Ottawa.....	1,284	Cases
" " C. A. Dobson, Jordan Station.....	2,141	"
" " Biggs Fruit & Produce Co., Burlington.....	282	"
" " Miscellaneous Shippers.....	36	"
Total.....	3,743	"

TEMPERATURE OF PEACHES IN TRANSIT TO, AND AT, MONTREAL.

All the peaches shipped by Mr. Dobson and the Biggs Fruit and Produce Co. were carried to Montreal by express whereas those shipped by our Department were carried by refrigerator car and fast freight, with the exception of the Bristol consignment, which was shipped by express. The peaches in this lot were at a temperature of 60 degrees when unloaded at Montreal. In the three subsequent shipments by refrigerator cars thermographs were carried, and the temperature in the first two cars during transit to Montreal ranged from 50 degrees at the start to 44 degrees when the cars were unloaded, and in the third car from 56 to 40 degrees. The actual temperature of the fruit at Montreal, *ex* the first refrigerator car, was 44 degrees for those peaches which had been pre-cooled before shipment, and 54 degrees for those packed the day of shipment and loaded without pre-cooling. In the second car the average temperature of the peaches was 50 degrees, and in the third car 45 degrees. The express shipment left St. Catharines on Tuesday at noon, and was delivered to the steamer at Montreal about noon the following day. In each case the refrigerator car left St. Catharines on Wednesday about 6.30 p.m., arrived at Point St. Charles, Montreal, before 7 o'clock Friday morning, and was placed alongside the steamship sheds on the dock about 2 p.m.

The temperature of Mr. Dobson's peaches, *ex* express cars, on arrival at Montreal was as follows:

September 10th—S.S. Tortona.....64 degrees
September 17th—S.S. Hurona.....60 degrees
September 24th—S.S. Devona.....56 degrees
October 1st—S.S. Cervona.....58 degrees
October 8th—S.S. Cairnrona....58 degrees

The condition of the Cervona lot was referred to by the fruit inspectors at Montreal as "very soft" and that of the Cairnrona as "soft." All peaches shipped by our Department were reported as in firm condition at Montreal.

The temperature of one lot of peaches shipped by the Biggs Fruit Company on the "Cervona," October 1st, was 60 degrees.

It will thus be seen that the express service was about twenty-four hours faster than the freight, but that the peaches carried in the iced cars were at a much better temperature than the others. If there is any delay *en route* peaches will not receive any damage in a well iced car, whereas, if they are carried by express, a delay in transit to or at Montreal at the temperatures mentioned above is dangerous. That this is liable to happen was shown in the case of Mr. Dobson's first express shipment, which, owing to an accident to the car, arrived in Montreal on the evening instead of the morning train, and, as a consequence, was not delivered on the dock until 11.30 p.m., the peaches being loaded in the steamer between one and two o'clock in the morning.

Inspection of Shipments at Montreal and at Ports in Great Britain.

All the peach shipments were closely looked after by our cargo inspectors at Montreal. Cars in which peaches were carried, whether by express or fast freight, were looked for by our Chief Cargo Inspector, and the officials of the Harbor Commissioner's staff (who have charge of the switching of export cars at the head of the docks) were urged by him to have the cars placed alongside the steamers with the least possible delay. Care was taken to see that the peaches were promptly loaded in the steamers, and that proper care was exercised in handling the packages and in stowing them in the chambers. Cases were well dunnaged in the steamers (by dunnage, I mean the placing of strips of wood between the tiers of cases, both horizontally and vertically, so as to insure a good circulation of air) and thermographs were placed in each chamber.

In London, Liverpool, Glasgow, and Bristol our inspectors were on the alert and remarkably quick deliveries were made. For instance, London peaches were on the market within three hours from the time discharge of cargo commenced. Our inspectors also made a careful report regarding the condition of the fruit on arrival and the prices realized by the brokers, although in some instances it was not possible for them to obtain accurate information on this latter point.

Condition of Canadian Peaches.

All the peaches shipped by our Department were landed in excellent condition. Mr. Dobson's shipments were also in good condition when discharged, excepting those *ex* the "Cervona" and "Cairnrona" which were reported over-ripe. Favorable reports were received *re* the condition of peaches shipped by the Biggs Fruit Company.

Temperatures in Refrigerator Chambers on Steamships.

Our instructions to the steamship companies were to carry peaches at a temperature of from 34 to 36 degrees, with a gradual rise of 55 degrees during the last day of the voyage in order to prevent sweating or the condensation of moisture on the cold fruit when removed from the refrigerators and exposed to a warmer atmosphere. Thermograph records in the steamers sailing to London, Glasgow and Bristol were satisfactory, but in the case of the three Liverpool boats in which our Department had shipments of peaches, through a misunderstanding, no rise of temperature occurred at the end of the voyage, the peaches being re-

moved from a temperature of 35 degrees to a temperature of 60 degrees, and, while our inspector reported that the peaches were landed in good condition, they did not appear to stand up as well as those shipped to the other ports, and I have no doubt that the reason for this was owing to the abrupt transition from a low to a high temperature.

I might mention here that South African peaches are carried by the Union Castle Line at a temperature of from 34 to 36 degrees, the voyage occupying seventeen days from Cape Town to Southampton by the fastest boats, which means between three and four weeks from the time the fruit leaves the orchard to the time of arrival at the port of discharge in Great Britain. The South African shipping season extends from the 1st of January to the end of March, so that they have the advantage of landing their peaches in England during cold weather.

Memo. showing number of days from port to port taken by steamers carrying Canadian peaches, season 1910, and extra time until discharge in the case of those which arrived in port Saturday or Sunday.

Steamer.	Date Sailed from Montreal.	Date of Arrival at port in Great Britain.	No. of Days on Voyage.	Extra Time until Discharge began.	No. of Days from Sailing Date until Discharge began.
Liverpool—					
Megantic	Sept. 16	Saturday, Sept. 24	8	2	10
Dominion	" 24	Monday, Oct. 3	9	1	10
Laurentic	" 30	Saturday, Oct. 8	8	2	10
Bristol—					
Ry. Edward	Sept. 15	Thursday, Sept. 22	7	..	7
Ry. George	" 29	" Oct. 6	7	..	7
London—					
Tortona	Sept. 10	Tuesday, Sept. 20	10	..	10
Hurona	" 17	Thursday, Sept. 29	12	..	12
Devona	" 24	Friday, Oct. 7	13	..	13
Cervona	Oct. 1	Saturday, Oct. 15	14	2	16
Cairnrona	" 8	" Oct. 22	14	2	16
Iona	" 15	" Oct. 29	14	2	16
Glasgow—					
Hesperian	Sept. 17	Sunday, Sept. 25	8	1	9
Ionian	" 24	" Oct. 2	8	1	9
Grampian	Oct. 1	" Oct. 9	8	1	9

NOTE.—The Department of Agriculture, Ottawa, made one shipment of peaches to London, via Liverpool, shipping on the Laurentic, which left Montreal on September 30th, arrived at Liverpool Saturday, October 8th, and discharged the peaches Monday morning, October 10th. The peaches left Liverpool by refrigerator car at 7 p.m. same day and were delivered in London at 7 a.m. the following morning, October 11th, or within eleven days from the time they left Montreal. These peaches were all sold by October 14th.

SHIPMENTS BY DOMINION AND PROVINCIAL DEPARTMENTS.

Many of you doubtless have noticed a recent press paragraph commenting in a "too many cooks spoil the broth" strain on the fact that both the Dominion and Provincial Departments of Agriculture had apparently made shipments of peaches to Great Britain this year, and I want to say a word or two in explana-

tion of the position of our Department in the matter. First, let me point out that it has always been generally recognized that the work of a Provincial Department lines along educational and instructional lines. In agriculture, for instance, the Department at Toronto is engaged in an endeavor to have two blades of grass grow where only one grew before, or, in other words, to convert the poor and indifferent farmer into an efficient and up-to-date agriculturist. On the other hand. to the Dominion has been relegated matters of transportation and trade and commerce, which include the extension of our markets abroad for Canadian products. Therefore, in making trial shipments of peaches to the Old Country this season our Department was engaged in a work which was eminently proper for a federal department to carry on.

The shipping of tender fruits to Great Britain by the Dominion Department of Agriculture is no new thing, as in 1897 we forwarded trial shipments of over 7,000 cases, of which over 1,400 cases were peaches. Since then, more particularly during the last four or five years, we have shipped, peaches, grapes, etc., to various parts of Europe for exhibition purposes. These lots, selected and packed by members of our staff, have always reached their destination in first-class condition.

Last year the Commissioner decided that it would be advisable to make a few trial shipments of peaches in 1910 in order to procure data regarding the proper degree of maturity at picking time, best method of packing, proper temperatures during transportation, etc. If shipments are made by private individuals or firms information of the above character is not readily available for the general public, so that it becomes necessary, if full and exact particulars are required, for the Department to make shipments itself.

An appropriation was secured during the Session of 1909-10, active preparations commenced in April, and all preliminary arrangements completed with the growers at St. Catharines by the first week of June. About this time Mr. Ruddick received a letter from Mr. Hodgetts, Director of the Fruit Branch, Toronto, intimating that his Department might send several shipments of peaches to Great Britain during the season. The Commissioner, in his reply, gave an outline of our plans, and pointed out that we were particularly well organized to carry on work of this nature with little extra trouble or expense. On June 14th, Mr. Hodgetts replied, and after stating: "It was our intention to arrange with a number of parties in the Niagara Peninsula for the shipment to London of experimental lots of peaches, sending forward three or four consignments according to the ripening of the more suitable varieties," he added, "I feel, however, that as you are in a better position both financially and otherwise to undertake the work on a fairly large scale, we will leave it entirely in your hands."

We very much appreciated Mr. Hodgett's graceful acquiescence with our point of view, and we went on with our arrangements. A little later we received a letter from Mr. Dobson, stating that he intended shipping several thousand cases of peaches to London, and asking for our assistance. During the remainder of the season our correspondence with Mr. Dobson was lengthy, and we rendered him all the assistance we could. None of his letters, however, contained any hint that the Provincial Department of Agriculture was in any way connected with his shipments, and only on October 21st, long after our last shipment had gone forward, did we learn (by a letter from Mr. C. C. James, in reply to one from Mr. Ruddick asking for information on this point), that it was the Ontario Government that had made the shipments from Jordan Station, and not Mr. Dobson,

although the latter supplied the peaches, made the shipping arrangements, and assumed all the financial responsibility.

Markets, etc.

As is indicated by the statement presented at the commencement of my remarks, the peaches shipped by our Department went to the ports of Liverpool, London, Glasgow and Bristol. The two Liverpool shipments were each divided between that market, Leeds and Manchester. The Bristol lot likewise served three markets, viz., Bristol, Cardiff, and Birmingham. The claim has been made that it would be better to have all the Canadian peaches which are exported shipped to London and distributed from there to the various markets, but to my mind the proposition is unsound. London is undoubtedly the best market for peaches, but it does not seem reasonable that fruit intended for sale in Liverpool and district should first be forwarded to London, and, after a delay of one or two days there, be re-shipped by rail to Liverpool. Apart from the extra expense and the risk of injury from extra handling and exposure during fairly warm weather, there is the important question of time in transit to be considered. As is shown by the preceding statement the boats in the Montreal-London service are slower than those running to Liverpool, Glasgow or Bristol, and peaches shipped *via* London would require from twelve to eighteen days to reach either Liverpool or Glasgow, as compared with ten and nine days by direct boats. The argument applies with even greater force to Bristol, which has a seven-day service from Montreal once every two weeks. The cold storage freight rate to each of the ports mentioned is the same, viz., 25s. a ton of forty cubic feet.

All of the peaches we shipped were sold by private sale excepting the two Liverpool lots of 51 and 102 cases, which were sold under the hammer. Cardiff made the highest price, viz., 6s. 6d. ($1.58) per case of 23 peaches, while the highest average price received was $1.45 per case for 72 cases "Old Mixon" sold in London. At the same time 78 cases "Elbertas" made an average of $1.39. In Cardiff, 25 cases "Crawfords" averaged $1.30 per case; Manchester made $1.33 per case for 12 cases and Leeds $1.22. On the other hand, 198 cases "Elbertas" sold in London for 94c. per case, 24 cases sold in Birmingham for 83c. per case, and 177 cases in Glasgow for 85½c. per case. The whole shipment of 1,284 cases sold at an average price of $1.04 per case, while the charges averaged as follows: Freight from St. Catharines to Montreal, 4c. per case; ocean freight, 9.6c.; selling charges in Great Britain, including commission, 9.7c.; total charges, 23.3c. per case, leaving average net returns f.o.b. cars St. Catharines of 80.7c. per case, or about 13½c. per pound. From this must be deducted, of course, the cost of the package, packing material and extra labor.

In conclusion I want to say that in my opinion a mistake was made this year by London brokers in holding for the last penny they could squeeze out of the retailer. When the latter was forced to pay 6 shillings and upwards for 18 or 20 peaches it meant retail prices of 12 to 16 cents per peach. At this price sales would be slow and the trade restricted. Many of the retailers in order to get their money back held the peaches too long, decay set in and they lost money on the transaction. Where this happened they naturally became prejudiced against Canadian peaches and will not want to handle them another year at any price. It is much better to have the brokers clear the peaches quickly at a fair price and give the retail dealer a chance to dispose of them rapidly at a reasonable profit

than to have them hanging around the market and the shops until they lose their flavour and become wasty or rotten. In this connection I think the following excerpt from "Fruit, Flower and Vegetable Trades' Journal," London, dated October 8th, 1910, is to the point:

"The Canadian peaches have turned out well, and quite up to the expectation of those who are handling them. Another consignment is now due. In boxes of 20's, selling at 5s. to 6s. 6d. per box, they should be handled by the majority of fruiterers. It will be wise if those handling consignments do not aim at higher prices than will make this fruit sell freely, for although English peaches are up to 24s. per dozen this week, it does not follow that the Canadian article is worth more than is being asked for it, and to raise the price will probably be to spoil the market, for it must be remembered that it is not every fruiterer that can handle peaches, or will some of those who might, until they become better acquainted with the quality and condition of these consignments. Of course, very few shops can handle peaches that cost two shillings apiece wholesale, but at threepence or fourpence each a good trade should be done at this time of year."

A Member: I think it would be advisable for the Department to find out from South Africa the exact varieties they are shipping there. I think it would be well to get buds from South Africa, and then we could plant the varieties that they are shipping from South Africa, and the sooner we get into the right varieties the better for ourselves.

Mr. Moore: If you write us for that information we have it right in the Department at Ottawa and we will give it to you.

The President: I have the names which have been submitted as delegates to attend the conference in 1911. Harold Jones, Walter Dempsey, R. W. Grierson, James E. Johnson, E. D. Smith, W. H. Bunting, Robt. Thompson, A. W. Peart, D. Johnson.

It was moved and seconded that the above members should be delegates to the conference.

The President put the motion, which on a vote being taken was declared carried.

RESOLUTION BY THE HISTORICAL COMMITTEE.

"Whereas the McIntosh apple tree grew till 1908 on the farm and on the spot where it was planted as a chance seedling over a century ago, and

"Whereas this variety has taken its place as the highest type of dessert fruit; and whereas it has shown its adaptability to a wide range of territory over the whole of the apple area of North America,

"We, therefore, wish to show our appreciation of the efforts of the people of Dundas County in the laudable object of erecting a suitable structure to mark the site of this tree.

"Resolved, therefore, that this Association contribute fifty dollors to the cost of this memorial."

The President put the resolution to the meeting, which on a vote being taken, was declared carried.

The Convention then adjourned.

FRUIT PRIZE LIST AT ONTARIO HORTICULTURAL EXHIBITION, 1910.

APPLES.

Class 1.—Barrels for Export.

Baldwin: 1st, Stork, R., Brooklin; 2nd, McGregor, W. E., Whitby; 3rd, Dempsey, W. H., Trenton.
Ben Davis: 1st, Dyer, W. D., Columbus; 2nd, Hamilton, Wm., Collingwood; 3rd, Osborne, J. J., Dunedin.
Golden Russet: 1st, Bunting, W. H., St. Catharines; 2nd, Ovens, Wm., Dunedin; 3rd, Hamilton, Wm.
Greening: 1st, Michael, R. R., Brooklin; 2nd, Bunting, W. H.; 3rd, Rush Bros., Hatchley.
King: 1st, Bunting, W. H.; 2nd, Crawford, M., Whitby.
Spy: 1st, Rush, Isaac, Norwich; 2nd, Groat, Chas., Brooklin; 3rd, Hamilton, Wm.
Stark: 1st, Smith, Alex., Enfield.
Any other variety: 1st, Stork, R.; 2nd, Bunting, W. H.; 3rd, Rush Bros.

Class 2.—Boxes Ready for Export.

(*Unwrapped.*)

Alexander: 1st, Oshawa Fruit Growers' Association; 2nd, Dempsey, W. H.
Baldwin: 1st, Bunting, W. H.; 2nd, VanDyke, J. W., Grimsby; 3rd, Hamilton, Wm.
Cranberry: 1st, Dyer, W. D.
Fameuse: 1st, Watson, W. G., Dixie; 2nd, Bunting, W. H.; 3rd, Goring, Geo., St. Catharines.
Golden Russet: 1st, Ovens, Wm.; 2nd, Blackburn, S., Creemore; 3rd, Brown, J. G., Humber Bay.
Greening (Rhode Island): 1st, Hamilton, Wm.; 2nd, Michael, R.; 3rd, Watson, W. G.
King: 1st, Bunker, S. C., Pickering; 2nd, Dempsey, W. H.; 3rd, Bunting, W. H.
McIntosh: 1st, Watson, W. B.; 2nd, Baker, Whitby.
Spy: Blackburn, S.; 2nd, Hamilton, Wm.; 3rd, McGregor, W. E.

Class 3.—Boxes for Export.

(*Fruit wrapped.*)

Fameuse: 1st, Bunting, W. H.; 2nd, Goring, Geo.; 3rd, Watson, W. G.
Gravenstein: 1st, Lick, E., Oshawa; 2nd, Thompson, R., St. Catharines.
King: 1st, Dempsey, W. H.; 2nd, Bunting, W. H.; 3rd, Goring, Geo.
McIntosh: 1st, Watson, W. G.
Spy: 1st, Hamilton, Wm.; 2nd, Bunting, W. H.; 3rd, Stainton, T., Taunton.
Wealthy.—1st, Crawforth, W.; 2nd, Brown, J. G.; 3rd, Hamilton, Wm.

Class 4.—Domestic Varieties—Barrels Ready for Shipment.

Blenheim: 1st, Brown, J. G.
Gravenstein: 1st, Lick, E.
Ontario: 1st, Westney Bros., Audley; 2nd, Guthrey, J. B., Dixie; 3rd, Dempsey, W. H.
Tolman:
Roxbury Russet: 1st, Ovens, Wm.; 2nd, Dempsey, W. H.; 3rd, Bunting, W. H.
Any other variety not in Class 1: 1st, The Biggs Fruit & Produce Co., Burlington; 2nd, Rush, Isaac; 3rd, Oliver, F. R., Lorne Park.

Class 5.—Domestic Varieties—Boxes Ready for Shipment.

(*Unwrapped.*)

Blenheim: 1st, Brown, J. G.; 2nd, Watson, W. G.; 3rd, Grierson, Oshawa.
Gravenstein: 1st, Lick, E.; 2nd, Stevenson, W. H., Oshawa; 3rd, Thompson, R.
Ontario: 1st, Dempsey, W. H.; 2nd, Westney Bros., Oshawa; 3rd, Guthrey, J. B.
Ribston: 1st, Hamilton, Wm.; 2nd, Osborne, J. J.; 3rd, Werry, Fletcher, Oshawa.
St. Lawrence: 1st, Watson, W. G.; 2nd, Goring, Geo.; 3rd, Bunting, W. H.
Any other variety not named in Classes 2 and 3: 1st, Bunting, W. H.; 2nd, Watson, W. G.; 3rd, Goring, Geo.

CLASS 6.—STANDARD WINTER VARIETIES—5 BOXES OF EACH.

(*Unwrapped.*)

Baldwin: 1st, VanDyke, J. W.; 2nd, Ovens, Wm.; 3rd, Bunting, W. H.

CLASS 7.—DESSERT VARIETIES—PLATES OF FIVE.

Fameuse: 1st, Westney Bros.; 2nd, Bunting, W. H.; 3rd, Goring, Geo., St. Catharines.
Golden Russet: 1st, Thompson, R.; 2nd, Brown, J. G.; 3rd, Guthrey, J. B.
Gravenstein: 1st, Stevenson, W. H.; 2nd, Thompson, R.; 3rd, Brown, J. G.
King: 1st, Bunker, S. C.; 2nd, Bunting, W. H.; 3rd, Goring, Geo.
McIntosh: 1st, Watson, W. G.; 2nd, Everett, Nicholas, Iroquois; 3rd, Michael, J. G
Wealthy: 1st, Guthrey, J. B.; 2nd, Brown, J. G.; 3rd, Remmer, H., Whitby.
Spy: 1st, Michael, R.; 2nd, Hamilton, Wm.; 3rd, Henderson, H. T., Paris.
Spitzenburg: 1st, Goring, Geo.; 2nd, Thompson, R.; 3rd, Bunting, W. H.
Any other variety: 1st, Watson, W. G.; 2nd, Bunting, W. H.; 3rd, Westney Bros.

CLASS 8.—COOKING VARIETIES—PLATES OF FIVE.

Alexander: 1st, Lee, W. T., Orillia; 2nd, Brown, J. G.; 3rd, Guthrey, J. B.
Baldwin: 1st, Bunting, W. H.; 2nd, McGregor, Wm.; 3rd, Henderson, H. T.
Blenheim: 1st, Watson, W. G.; 2nd, Thompson, R.; 3rd, Brown, J. G.
Cayuga: 1st, Bunting, W. H.; 2nd, Thompson, R.; 3rd, Stewart, F. G., Homer.
Greening (Rhode Island): 1st, Michael, R.; 2nd, Bunting, W. H.; 3rd, Brown, J. G.
King: 1st, Brown, J. G.; 2nd, Guthrey, J. B.; 3rd, Thompson, R.
Ribston: 1st, Guthrey, J. B.; 2nd, Brown, J. G.
Spy: 1st, Wait, J. G., Wicklow; 2nd, Biggs Fruit & Produce Co.; 3rd, Palmer, W. E., Marshville.
Any other desirable variety: 1st, Guthrey, J. B.; 2nd, Biggs Fruit & Produce Co.; 3rd, McGregor, Wm.

CLASS 9.—STANDARD WINTER VARIETIES—TEN PLATES OF FIVE SPECIMENS EACH.

Baldwin: 1st, VanDyke, J. W.; 2nd, Stork, R.; 3rd, Guthrey, J. B.
Greening: 1st, Brown, J. G.; 2nd, Watson, W. G.
Spy: 1st, Palmer, W. E.; 2nd, Henderson, H. T.; 3rd, Guthrey, J. B.

CLASS 10.—CONES OF FRUIT.

Ben Davis: 1st, Palmer, W. E.; 2nd, Dyer, W. D.
Baldwin: 1st, Stork, R.; 2nd, VanDyke, J. W.; 3rd, Guthrey, J. B.
Blenheim: 1st, Brown, J. G.; 2nd, Watson, W. G.; 3rd, Grierson, Oshawa.
Gravenstein: 1st, Whyte, D., Woburn; 2nd, Lick, E.
Fallawater: 1st, Stork, R.
Fameuse: 1st, Watson, W. G.; 2nd, Guthrey, J. B.; 3rd, Stainton, T.
King: 1st, Watson, W. G.; 2nd, Guthrey, J. B.
McIntosh: 1st, Watson, W. G.; 2nd, Farlinger, Ernest, Morrisburg; 3rd, Lee, W. T.
Ontario: 1st, Guthrey, J. B.; 2nd, Westney Bros.; 3rd, Watson, W. G.
Spy: 1st, Henderson, H. T.; 2nd, Watson, W. G.; 3rd, Palmer, W. E.

PEARS.

CLASS 11.—PLATES OF FIVE.

Anjou: 1st, Guthrey, J. B.; 2nd, Stewart, F. G.
Bosc: 1st, Read, M. A., Port Dalhousie; 2nd, Furminger, S. D., St. Catharines.
Clairgeau: 1st, Guthrey, J. B.; 2nd, Stewart, F. G.
Duchess: 1st, Stewart, F. G.; 2nd, Thompson, Robt.
Hardy: 1st, Read, M. A.
Howell: 1st, Stewart, F. G.; 2nd, Thompson, R.
Kieffer: 1st, Stewart, F. G.; 2nd, Thompson, R.
Lawrence: 1st, Stewart, F. G.; 2nd, Thompson, R.
Winter Nelis: 1st, Read, M. A.; 2nd, Stewart, F. G.
Any other desirable variety: 1st, Stewart, F. G.; 2nd, Thompson, R.

CLASS 12.—EXPORT VARIETIES—BOXES READY FOR SHIPMENT.

(*Fruit wrapped.*)

Anjou: 1st, Robertson, G. A., St. Catharines; 2nd, Stewart, F. G.; 3rd, Thompson, R.
Bosc: 1st, Thompson, R.; 2nd, Bunting, W. H.; 3rd, Robertson, G. A.
Clairgeau: 1st, Thompson, R.; 2nd, Stewart, F. G.
Duchess: 1st, Stewart, F. G.; 2nd, Robertson, G. A.; 3rd, Thompson, R.
Winter Nelis: 1st, Stewart, F. G.; 2nd, Thompson, R.; 3rd, Furminger, S. D.
Kieffer: 1st, Robertson, G. A.; 2nd, Stewart, F. G.; 3rd, Thompson, R.
Lawrence: 1st, Robertson, G. A.; 2nd, Stewart, F. G.; 3rd, Thompson, R.
Any other desirable variety: 1st, Stewart, F. G.; 2nd, Furminger, S. D.; 3rd, Thompson, R.

GRAPES.

CLASS 13.

Agawam: 1st, Dewar, R. H., Fruitland; 2nd, Robson, W. M., Lindsay.
Concord, 3 bunches: 1st, Dewar, R. H.; 2nd, Bunting, W. H.
Lindley, 3 bunches: 1st, Dewar, R. H.; 2nd, Stewart, F. G.
Niagara, 3 bunches: 1st, Dewar, R. H.; 2nd, Bunting, W. H.
Vergennes: 1st, Bunting, W. H.; 2nd, Stewart, F. G.
Wilder: 1st, Thompson, R.; 2nd, Furminger, S. D.
Any other desirable variety: 1st, Dewar, R. H.; 2nd, Bunting, W. H.
Black Grapes, 9 lb. basket: 1st, Dewar, R. H.; 2nd, Stewart, F. G.
Red Grapes, 9 lb. basket: 1st, Bunting, W. H.; 2nd, Dewar, R. H.
White Grapes, 9 lb. basket: 1st, Dewar, R. H.; 2nd, Bunting, W. H.
Black Grapes, fancy package: 1st, Dewar, R. H.; 2nd, Furminger, S. D.
Red Grapes, fancy package: 1st, Dewar, R. H.; 2nd, Thompson, R.
White Grapes, fancy package: 1st, Dewar, R. H.; 2nd, Stewart, F. G.

COLLECTIONS.

CLASS 14.

Exhibit of apples in commercial packages, space limited to 60 square feet for each exhibit: 1st, St. Catharines Cold Storage Co.; 2nd, Stewart, F. G.
Display of apples, not in commercial packages, table space limited to 60 square feet for each exhibit: 1st, St. Catharines Cold Storage Co.; 2nd, Stewart, F. G.

CLASS 15.—BOX OR BARREL BRANDS.

1st, Oshawa Fruit Growers' Association; 2nd. St. Catharines Cold Storage & Forwarding Co.; 3rd, Stewart, F. G.

CLASS 16.

Commercial package of unwrapped apples, any variety: 1st, Hamilton, Wm.; 2nd, Dempsey, W. H.; 3rd, St. Catharines Cold Storage & Forwarding Co.
Commercial package, wrapped apples, any variety: 1st, Osborne, J. J.; 2nd, St. Catharines Cold Storage Co.; 3rd, French, P. E., O. A. C., Guelph.

PRESERVED FRUITS.

CLASS 17.—QUART SEALER OF CANNED FRUIT OF EACH OF THE FOLLOWING VARIETIES.

Blackberries: 1st, Morningstar, S., Goderich; 2nd, Depotie, Mrs. P., St. Catharines; 3rd, Delworth, Thos., Weston.
Cherries, black or red: 1st, Reeves, Mrs. F. F.; 2nd, Thompson, Mrs. R.; 3rd, Hassard, Mrs., Markham.
Cherries, white or yellow: 1st, Depotie, Mrs. P.; 2nd, Stewart, Mrs. F. G.; 3rd, Hassard, Mrs.
Gooseberries: 1st, Thompson, Mrs. R.; 2nd, Stewart, Mrs. F. G.; 3rd, Wait, Mrs. J. G.
Grapes, black or red: 1st, Delworth, Mrs. T.; 2nd, Morningstar, S.; 3rd, Wait, Mrs. J. G.

Peaches (white fleshed): 1st, Depotie, Mrs. P.; 2nd, Stewart, Mrs. F. G.; 3rd, Bennett, C. A., Burlington.
Peaches (yellow fleshed): 1st, Bennett, Mrs. C. A.; 2nd, Stewart, Mrs. F. G.; 3rd, Hassard, Mrs.
Pears: 1st, Morningstar, S.; 2nd, Depotie, Mrs. P.; 3rd, Speight, Mrs., Markham.
Plums, blue or red: 1st, Depotie, Mrs. P.; 2nd, Stevenson, Mrs. W. H., Oshawa; 3rd, Wait, Mrs. J. G.
Plums, green or white: 1st, Thompson, Mrs. R.; 2nd, Depotie, Mrs. P.; 3rd, Stewart, Mrs. F. G.
Raspberries, red: 1st, Wait, Mrs. J. G., 2nd, Bennett, Mrs. C. A.; 3rd Thompson, Mrs. R.
Raspberries, black: 1st, Bennett, Mrs. C. A.; 2nd, Reeves, Mrs. F. F.; 3rd, Depotie, Mrs. P.
Strawberries: 1st, Wait, Mrs. J. G.; 2nd, Stewart, Mrs. F. G.; 3rd, Delworth, Mrs. T.

CLASS 18.—PINT JAR OF JAM OF EACH OF THE FOLLOWING VARIETIES.

Currant, black: 1st, Whyte, David, Woburn; 2nd, Speight, Mrs.; 3rd, Bennett, Mrs. C. A.
Gooseberry: 1st, Hassard, Mrs.; 2nd, Bennett, Mrs. C. A.; 3rd, Stewart, Mrs. F. G.
Grape: 1st, Delworth, Mrs. T.; 2nd, Hassard, Mrs.; 3rd, Bennett, Mrs. C. A.
Peach: 1st, Thompson, Mrs. R.; 2nd, Stewart, Mrs. F. G.; 3rd, Depotie, Mrs. P.
Pear: 1st, Wait, Mrs. J. G.; 2nd, Morningstar, S.; 3rd, Hassard, Mrs.
Plum: 1st, Stewart, Mrs. F. G.; 2nd, Morningstar, S.; 3rd, Thompson, Mrs. R.
Raspberry: 1st, Depotie, Mrs. P.; 2nd, Bennett, Mrs. C. A.; 3rd, Speight, Mrs.
Strawberry: 1st, Bennett, Mrs. C. A.; 2nd, Thompson, R.; 3rd, Speight, Mrs.

CLASS 19.—HALF-PINT JAR OF JELLY OF EACH OF THE FOLLOWING VARIETIES.

Apple: 1st, Bennett, Mrs. C. A.; 2nd, Hassard, Mrs.; 3rd, Delworth, Mrs. T.
Crab apple: 1st, Morrison, Mrs. C., Woburn; 2nd, Whyte, David; 3rd, Mrs. W. H. Stevenson.
Currant, red: 1st, Morrison, Mrs. C.; 2nd, Stewart, Mrs. F. G.; 3rd, Thompson, Mrs. R.
Grape: 1st, Depotie, Mrs. P.; 2nd, Bennett, Mrs. C. A.; 3rd, Stewart, Mrs. F. G.
Quince: Thompson, Mrs. R.; 2nd, Stewart, Mrs. F. G.; 3rd, Depotie, Mrs. P.
Raspberry, red: 1st, Stewart, Mrs. F. G.; 2nd, Whyte, David; 3rd, Morrison, Mrs. C.

CLASS 20.—GRAPE JUICE, ETC.

Grape Juice, unfermented, 1 quart bottle: 1st, Hassard, Mrs.; 2nd, Thompson, Mrs. R.; 3rd, Stewart, Mrs. F. G.

Display by any branch Women's Institute to consist of Ontario grown fruits and vegetables, preserved, canned, dried, pickled, or put up in any other way intended to prolong keeping qualities for food; not more than 2 jars of any one kind: 1st, East York Women's Institute; 2nd, Queenston Women's Institute; 3rd, Bobcaygeon Women's Institute; 4th, Whitby Women's Institute.

SPECIMEN APPLES.

CLASS 21.—SPECIMEN APPLES OF STANDARD VARIETIES.

Baldwin: 1st, Osborne, J. J.; 2nd, Thompson, R.
Fameuse: 1st, Bunting, W. H.; 2nd, Guthrey, J. B.
Greening (Rhode Island): 1st, Michael, R.; 2nd, Watson, W. G.
King: 1st, Bunting, W. H.; 2nd, Dempsey, W. H.
McIntosh: 1st, Watson, W. G.; 2nd, Stephens, C. L., Orillia.
Spy: 1st, Ovens, Wm.; 2nd, Michael, R.
Wolf River: 1st, Huggard, R. L., Whitby.

REPORT

OF

FRUIT BRANCH

Department of Agriculture

ONTARIO

1910

Published by the Ontario Department of Agriculture, Toronto

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO

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1911

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., ETC., ETC., ETC.

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Fruit Branch of the Department of Agriculture for 1910.

Respectfully submitted.

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1911.

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REPORT OF THE FRUIT BRANCH

1910.

To the Honourable James S. Duff, *Minister of Agriculture*:

I beg to transmit herewith for approval a report of the work carried out by the Fruit Branch of your Department for the year 1910. The expenditure, as given below, covers all of the regular lines of work but all expenses in connection with orchard surveys was borne by the Incidental Vote of the Legislature which includes special investigations in agricultural conditions and production of crops.

EXPENDITURE, 1910.

Grants to Associations	$ 5,300.00
Orchard spraying demonstrations	4,170.08
Inspection of apiaries	2,554.43
Exhibitions, cold storage	4,500.42
Horticultural Experiment Stations, salaries, etc.	12,822.84
Horticultural Experiment Station, boiler, etc.	393.48
Expenses of Experiment Stations, etc.	1,525.42
Inspection of nurseries and orchards	3,775.17
Salaries	3,140.00
Contingencies	1,399.39

Your obedient servant,

P. W. Hodgetts, *Director.*

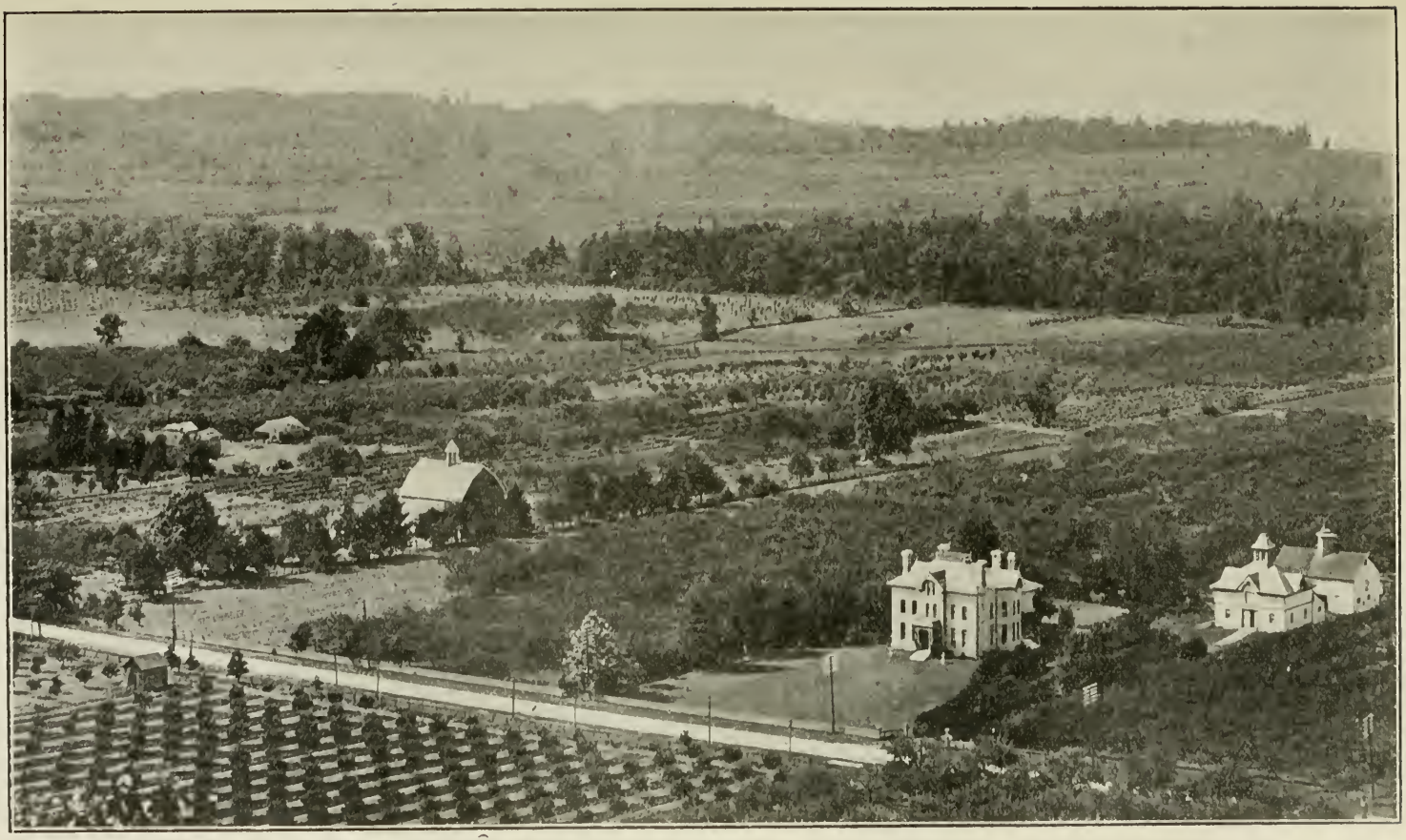
WORK OF THE FRUIT GROWERS' AND BEEKEEPERS' ASSOCIATIONS.

Perhaps no other branch of agricultural industry on the American Continent has shown such advancement in recent years as has that of fruit growing. Undoubtedly much of the interest aroused is due to the advertising campaign carried on by the western real estate agents who have been reaping a rich harvest from the sales of lands for the growing of fruits and truck crops at high figures. These agents have painted glowing pictures of the enormous profits that await the man, experienced or otherwise, who would buy these lands and plant them in orchard or vineyard. The average man, of course, required some statement of profits already made before he would accept the bait held out to him. This was easily found by the wide-awake westerner, and while his methods of computation are open to criticism, the figures that he gave out seemed to catch the popular mind. Single trees in the orchards already in existence would often give a remarkable crop which would be sold at high figures. From this it was easy enough to calcu-

A well-cared-for 2-year-old peach orchard on the farm of C. E. Fisher & Sons, Queenston.

late the returns to be expected from an acre of similar trees. With splendidly illustrated pamphlets and attractively worded advertisements thousands of men from the eastern farms and cities were induced to take up their homes in the far Western States and Provinces.

The experienced and somewhat conservative eastern fruit grower has been hard to convince that the enormous profits reported are entirely reliable. They have themselves learned that there are many individual cases, both of trees or of small orchards, that have given very handsome returns from fruit growing in this Province. What has happened, however, is that the figures given by the western men have led our own growers to investigate more closely the financial part of their business. They have now the idea that by improved conditions all along the line in orchard work much greater profits will result than in the past. Realizing that the big markets of the east will take an enormous quantity of fruit,



Prosperous orchards in Niagara district viewed from the Niagara escarpment.

not at fabulous prices, but at a high enough figure to give the grower a fair profit, they are seeking methods whereby the cost of production can be reduced, the quantity and quality of the fruit increased and the result a better outlook for their business.

In looking over the fruit districts many records have been found of sales from small areas that are quite good enough for the eastern grower. For instance, one of our largest fruit growers of the Niagara District reports that from four acres of sweet cherries the crop was 3,800 baskets, which gave a net profit of approximately $700 per acre. This was in a year of big crops, and prices were much lower than normal. Since then this grower has reported that the returns have greatly exceeded these figures.

Small orchards of apples by proper care also give splendid returns as shown by the following:

1ST—ORCHARD OF 33 TREES.

Spray material	$ 4.59	17 bbls., class 1	$56.10
Work account	23.35	107 " " 2	321.00
177 bbls. at 41c.	72.57	4 " " 3	10.60
177 commission at 20c.	35.40	49 " " 4	115.15
Cheque to balance	410.56	Peelers and ciders	43.62
	$546.47		$546.47

Net returns, 1909.....$410.56

2ND—ORCHARD OF 1½ ACRES.

Spray material	$16.22	31 bbls., class 1	$102.30
220 bbls. at 41c.	90.20	104 " " 2	312.00
220 bbls., commission at 20c.	44.00	18 " " 3	47.70
		66 " " 4	155.10
		1 " " 5	2.00
Cheque to balance	539.04	Peelers and cider	70.36
	$689.46		$689.46

Net returns.....$539.04

Attention is called to the details given under the orchard demonstration work of the present season, which will be found on page 14. In these latter cases the orchards had been planted years ago, but practically neglected and were chosen for demonstration purposes in most cases on account of their poor condition.

We wish, however, to give rather the returns from commercial orchards so that the prospective orchardist may gain some idea as to the profits which he may expect to receive in future years. Instances are here given of yields from apple and peach orchards in this Province which have been gained by intelligent and careful methods and for which all of our fruit growers should strive:

TWELVE ACRES APPLES—300 TREES.

	Net returns over expenses.
1903	$1,200.00
1904	650.00
1905	1,000.00
1906	1,000.00
1907	1,000.00
1908	1,600.00
1909	2,000.00
	$8,450.00

A farm in Halton County containing two orchards gave the following returns: 10 acres planted out in Spies netted the owner $2,500, the buyer assuming all the risk and the cost of picking and packing. The other orchard consisted of 15 acres of mixed varieties from which were exported 1,700 boxes with a big balance disposed of locally. The returns gave the owner of the orchard from $4.50 to $7.00 per barrel, which would make a very nice profit on the investment in this farm.

One of our eastern apple growers, who has made a specialty of Snows and McIntosh, states that from a careful record of sales made from the product of four acres of Snows, dating from 1894 to 1903, a period of nine years, he received an average net return of $800 per annum, or $200 per acre after paying all expenses except the cost of barrels. In 1904, after an extremely heavy crop, which was not thinned, the orchards were injured by a severe winter, since which time the net returns have run from $400 to $900 per annum. The largest returns any one year were $1,310.

A prominent peach grower of the Niagara District was awarded a Wilder silver medal by the American Pomological Society for the following record of his peach orchard:

Area, 23½ acres; age, nine years; varieties, and number of each, Elberta, 700; St. John, 1,500; E. Crawford, 800; N. Prolific, 1,000. Total, 4,000.

Gross receipts	$11,008.29
Express and commission	2,137.85
Net	8,870.44
Expense of orchard	1,077.75
Management (supervision)	750.00
Profit	7,042.69

All of these instances show a profit of over $100 per acre, some for a long term of years. Perhaps no other farm crop in Ontario can show anything near as great a net profit per acre as do these trees. What we now need is the planting of commercial orchards, large areas of few varieties in well defined districts. Too many of the present orchards contain varieties that are unprofitable even under the best of conditions, varieties which also when unloaded on our markets tend to demoralize conditions there. Fortunately hundreds of thousands of these trees are so far advanced in years that their number will steadily decrease within the next quarter century, and we can look forward to the time when Ontario will be producing fewer varieties of better quality and in much larger quantity, a condition which is much to be desired from a commercial standpoint. As a result of fifteen years or more of experimental work we know exactly what varieties are suitable to the various apple districts of the Province.

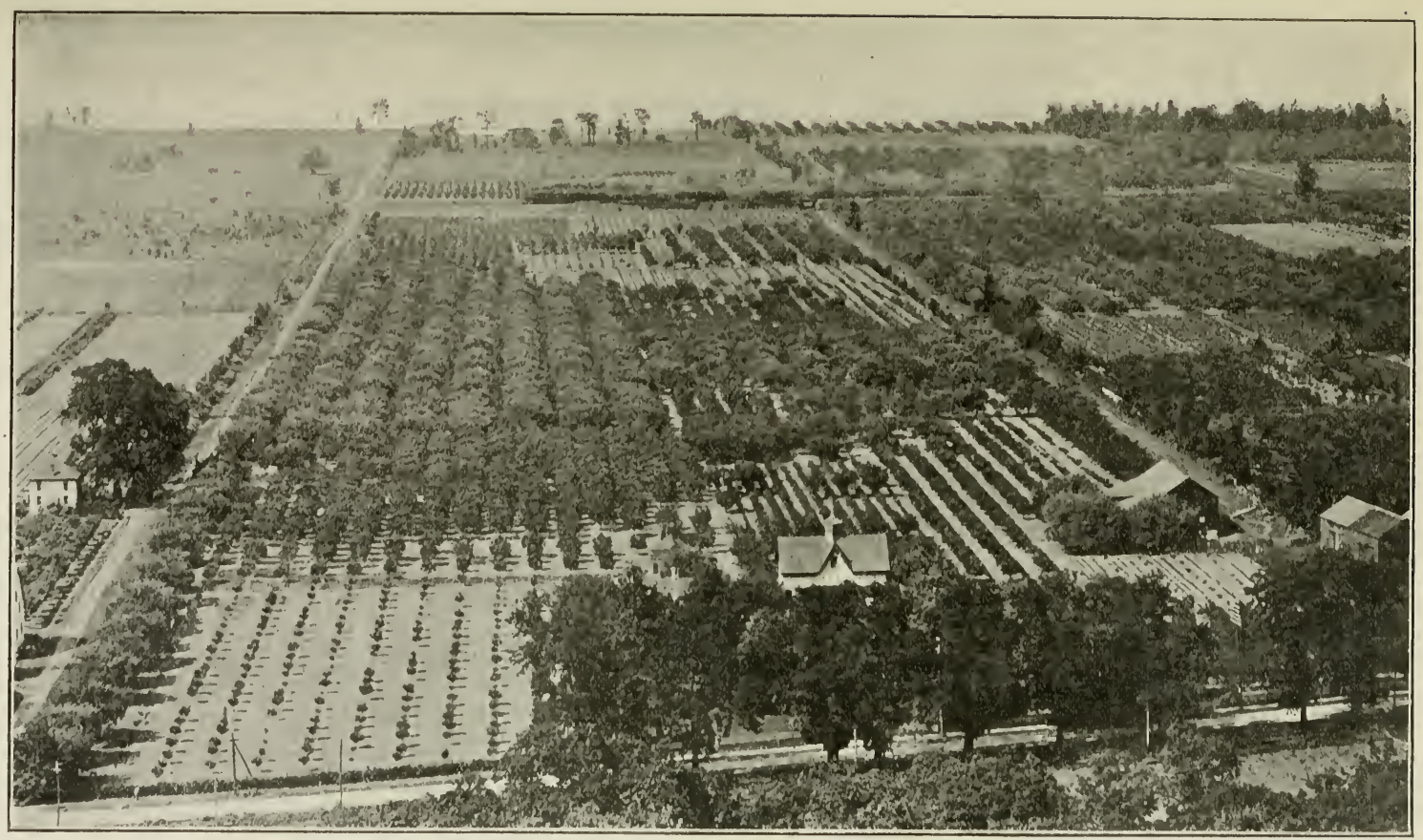
Sales by our nursery companies for the past few years show that enormous plantings have already taken place and it should be the aim of every fruit grower to bring these trees into bearing under the best known conditions of the present day. That great interest is being taken in orchard care is shown by the enormous demand for horticultural literature of all kinds and for instruction and advice in all matters relating to fruit growing.

Partly as a result of this boom in orcharding in Ontario there have been organized a number of companies for the buying and leasing of orchards. While it is quite a common practice across the border and in British Columbia for companies to purchase blocks of land and set these out in orchards, the leasing of large blocks of trees already in bearing seems to be something quite new. As a result

of the claims of profits in orcharding, business men have been investigating the industry as a source of investment for capital and apparently satisfied with the opportunities offered, have invested quite largely. One concern has leased and purchased over 100,000 full grown apple trees, and claims that it will shortly double this number. These trees have been secured as far as possible in well-known apple growing counties along the lakes, and in sections where several orchards can be procured in close proximity. Two other companies control blocks of orchard from 200 to 600 acres in extent, while others would average from 100 to 200 acres. The business men at the heads of these concerns have employed the best men procurable at good salaries to manage the orchards, and the result will be that when their staffs have been properly organized the orchards under their care should be models for the surrounding country. In addition the fact that these concerns believe that money can be made from orchards will lead many of the farmers in the same localities to pay more attention to their own trees. The leases obtained by these concerns generally run from five to seven years, with the option of a further extension for three years. The prices paid for the leases vary from 50 cents to $1 per tree per annum, net, to the owner of the orchard. Where a man has been neglecting his trees this seems to be a fair profit, and in many cases the leases were signed without much trouble. Fruit growers, however, who had been paying attention to their trees realized that they could make much more out of the orchard themselves, and the companies had difficulty in such instances in securing a lease. Here in many cases the orchards were purchased outright at a good figure and one of the companies claims that it owns one-half of the trees that it is managing.

In line with the above practice there has been great activity shown in the purchase of large blocks of farm lands, particularly in the counties of Lincoln and Norfolk. These lands are being rapidly planted to fruits of all kinds, especially peaches and apples, one block alone of 65,000 peach trees having been set out. The intention in these cases is not always to make money out of the sale of the products of the orchards. Advertisements are already appearing, particularly in the Old Country papers, offering subdivisions of these blocks to intending fruit growers. The company will either turn the lands over now to the purchaser, or will carry on the cultivation of the trees until they are in bearing for a fixed sum per acre. Most of these small holdings will go to well-to-do settlers from Great Britain, although many residents of our big towns and cities are investing with the hope some day of going in for the fruit growing business. These classes have proved to be a distinct gain in many cases to the farming communities. The excellent business training which most of them have received goes far to make up for the inexperience which they may have in general farm management. They come to the business without any preconceived ideas as to what is required, and are willing to adopt up-to-date methods that the ordinary farmer might look on with a great deal of hesitation. The claim has often been made that the success obtained by a number of the well-known western fruit sections is due to the presence of these men who have received their business training in the cities of the east.

Since the opening of the London office of the Ontario Government, in charge of Mr. N. B. Colcock, there has been a decided demand for information respecting Ontario fruit lands, fruit crops, etc. Every year now quite a large number of well-educated Old Country men come to our office for direct information about the various districts, the kinds of fruit grown there, prices of fruit lands and other information which will aid them in selecting the best locality to settle. To prevent these men from falling into the hands of land agents who would take advantage of their inexperience, we have always advised that the intending fruit grower should



Beautiful orchards, viewed from mountain near Grimsby, Niagara district.

be in no hurry to purchase, but that he should, if possible, spend the first season in working with some of the fruit growers who are already in the business, preferably one from Great Britain. Then in the fall of the year he could look about for a suitable place to purchase with the idea of getting it in shape in plenty of time for the following spring's operations. The greatest difficulty, however, is in securing positions for these men during the fruit season. This is always a very busy time with the growers, and few of them care to have an inexperienced man on the farm, even though the pay for the same be much smaller than he would ordinarily have to give. To partially meet this difficulty an Old Countrymen's Association has been organized in the Niagara District, where the majority of these men desire to settle. This Association has given much advice to the intending settler, and has saved a great many from purchasing lands at figures which were much too high for their value. Some criticism has been made of the Ontario Government for not still further pushing in Great Britain the opportunities for men of means to invest in fruit and other kinds of farms in this Province. Unless some system of training and supervision could be devised it would not be advisable to have too many of this class reach the country in any one year. While there is an unlimited demand and plenty of work for the ordinary farm laborer, there are not the same opportunities for those of a better class to secure the training which they should have before they start out in the business.

LEGISLATION.

A number of amendments were made in the Fruit Pest Act to cover certain objections that had been offered to it since its passing in 1909. The Act as amended is published herewith:

AN ACT TO PREVENT THE SPREAD OF INSECT AND FUNGOUS DISEASES.

1. This Act may be cited as The Fruit Pest Act.

2. In this Act "Minister" shall mean the Minister of Agriculture for the Province of Ontario. "Plant," shall mean any tree, vine, shrub or plant. "Disease" shall mean the following insects and diseases in any stage of development: Codling Moth, San Jose Scale, Yellows, Little Peach, Black Knot, Pear Psylla and Pear Blight.

3. On the recommendation of the Minister, the Lieutenant-Governor in Council may appoint one or more competent persons to act as inspectors, whose duties shall be to enforce the provisions of this Act.

4. No person shall import or bring, or cause to be imported or brought into the Province of Ontario, for any pupose whatsoever, any diseased plant or fruit, or sell or dispose of, or offer for sale any fruit infested with San Jose Scale, Yellows or Little Peach. Wherever such diseased fruit exists or is believed by the Provincial Inspector to exist, he may make an examination and inspection, and may order any fruit so infested, or such part as he may deem advisable, to be destroyed.

5. No person shall keep or have, or offer for exchange or sale, any diseased plant.

(a) All persons, owning, leasing or managing any orchard or collection of plants, other than a nursery, shall, when any plant therein becomes diseased and forthwith on becoming aware, whether by notice or otherwise, of such disease, destroy, such plant by fire or shall effectually treat the disease by fumigation or spraying with such material as may be prescribed by the Minister.

(b) The Council of any city, town, township or incorporated village may, and upon the petition of twenty-five or more fruit growers who are ratepayers, shall by by-law appoint at least one inspector to enforce the provisions of this Act in the municipality and fix the amount of remuneration, fees or charges he shall receive for the performance of his duties. All such appointments, as well as such remuneration, fees or charges shall be subject to, and be only operative on the written approval of the Minister, communicated by him to the clerk of the municipality. The

by-law shall not take effect unless and until approved by the Minister of Agriculture, and shall remain in force only for the calendar year in which it has passed. The clerk of the municipality shall transmit a certified copy of every such by-law to the Minister of Agriculture before the first day of March after the passing thereof.

(c) Upon the report of the Inspector appointed by the municipality to the Inspector appointed under Section 3 of this Act, that there is disease upon the plants on any lot within the municipality, the latter Inspector shall direct the former Inspector to give notice personally or by registered letter to the owner or occupant of the lot to have the plants forthwith sprayed or to have them destroyed by burning, as may be determined by the Inspector appointed under section 3 of this Act; and in case this is not done within ten days after the notice has been given the Inspector appointed by the municipality may cause the spraying or destruction by burning to be done, and on notice being sent to the Clerk the cost of the work shall be charged on the lot and be collected as a special tax in addition to the other taxes imposed by the municipal council on the lot.

(d) All such inspectors appointed shall be subject to and observe the regulations and directions of the Minister, and shall be subject and subordinate to the inspector appointed by the Minister, and in case of any neglect of duty such inspector shall be subject to the penalties prescribed by this Act.

(e) The council of the city, town, township or incorporated village shall pay the remuneration, fees or charges of such inspectors and shall be entitled to receive from the Department of Agriculture one-half of the amount so paid upon furnishing the Department with statements of the sums so paid, certified to by the inspector appointed by the Minister, provided that such statements are submitted to the Minister on or before the fifteenth day of December of the year to which they apply.

6. The owner or proprietor of any nursery shall not send out or permit any plant to be removed from his nursery without the same being first fumigated by hydrocyanic acid gas in accordance with regulations prescribed by Order of the Lieutenant-Governor in Council.

7. No person shall sell or dispose of or offer for sale any plant obtained, taken or sent out from a nursery unless the said plant has been previously fumigated by hydrocyanic acid gas in accordance with the above regulations.

8. In case the inspector finds disease in any nursery, and so reports to the Minister, the Minister may thereupon inform in writing the owner or proprietor or manager of said nursery of the existence of disease in his nursery and the owner or proprietor or manager of said nursery shall not thereafter permit any plant or plants to be removed from the said nursery until he is notified in writing from the Minister that the Inspector has reported to the Minister that it is safe in the public interest to permit the said nursery stock to be removed after fumigation.

9. For the purpose of scientific investigation the Minister may from time to time, by writing given under his hand, except such persons as he may deem proper from the operation of the two preceding sections, and while acting under such permission such persons shall not be subject to the penalties imposed by this Act.

10. Any person having reason to suspect that any plant in his possession or in his charge or keeping is diseased shall forthwith communicate with the Minister in regard to the same, and shall furnish the Minister with all such information in regard to the source or origin of the said infestation and nature of the same as he may be able to give.

11.—(a) Whenever disease exists or is supposed to exist on any plant, the Minister may direct a competent person to make an examination and inspection, and may order that any plant so infested, or such part as he may deem advisable, shall be immediately destroyed by burning, either by the person appointed to make the inspection or by the person owning or having possession of the said plant, or some other person so directed in writing, and the person so directed shall make a full report to the Minister in writing as to the nature and extent of the work so performed, together with a fair estimate of the value of the plants destroyed.

(b) If, in the case of an orchard or collection of plants, the inspector finds disease on plants located in several different parts of the orchard or collection, and decides that it is advisable in the public interest to destroy all the plants in such orchard, or in any part or parts thereof, and so reports to the Minister, the Minister may direct that an examination or inspection shall be made by an additional inspector and upon their advice in writing he may direct that all the plants in such orchard or such collection of plants or in such part or parts thereof shall be destroyed, without requiring that every plant in the said orchard or collection shall be first examined.

12. Any person appointed under section 3 of this Act to inspect or destroy any plant for the purpose of enforcing the provisions of the Act, and any inspector appointed by the Council of any municipality, shall, upon producing his authority in writing, have free access to any nursery, orchard, store-room, or other place where it is known or suspected that any plant is kept.

13. Any person neglecting to carry out the provisions of this Act, or any person offering any hindrance to the carrying out of this Act, shall upon summary conviction be liable to a fine of not less than twenty dollars nor more than one hundred dollars, together with costs, and in default of payment thereof shall be subject to imprisonment in the common gaol for a period of not less than ten days nor more than thirty days.

14. The Lieutenant-Governor in Council may, by Order, direct that other diseases than those mentioned may be included in the provisions of this Act, and thereafter during the continuance of such Order-in-Council the word "disease" in this Act shall include all such other diseases. Public notice of such Order-in-Council shall be given by publication in two successive issues of "The Ontario Gazette."

15. The Acts known as The Yellows and Black Knot Act, The Noxious Insects Act, and the San Jose Scale Act are hereby repealed.

DEMONSTRATION ORCHARDS.

This season a new line of work was undertaken by this office with the hope that a decided renewal of interest would take place in some of our orchard districts. What are known as demonstration orchards were selected, and work carried on in them throughout the season. The idea was to go into some section where there already existed numerous orchards whose owners not having obtained much profit from them had practically ceased caring for them in any way. A number of small orchards were selected, generally with a view to having them near some much-used highway. The owners agreed to allow the Department to prune and spray the trees without any expense to themselves, while they were to undertake the cultivation, manuring, sowing of a cover crop and the harvesting of the fruit. Where desired the Department agreed to find sale for the apples. An experienced orchardist was placed in charge of each district and spent is whole time supervising the pruning, spraying. etc. Large signs were placed on the sides of the road calling attention to the orchards and a number of orchard meetings were held throughout the season when the work was being carried on. Two sections where the Department already had representatives were chosen for the first year, namely the northern part of Simcoe County, where Mr. I. F. Metcalf had his office at Collingwood, and Dundas County, with Mr. A. D. Campbell at Morrisburg. The latter handled all of the work directly through his office with some assistance from this Branch. The work in Simcoe County, which covered a wider area, was in charge of Mr. W. F. Kydd, of Simcoe. The results are very gratifying even for the first year, and a great deal of interest was shown, with the result that not only were many old orchards put into shape the past winter, but also many orders had been placed for nursery stock to be set out in the spring of 1911. The figures from a number of these orchards showing the expense and returns are given herewith. It will be noted that the charge made by the farmers for their teams is very low, but this would be offset in an ordinary season by much lower cost of pruning.

1st Orchard of 50 Trees.

Expenses:

1. Scraping, 1½ days at $1.50	$2 25
2. Pruning, 16½ days at $1.50	24 75
3. First spraying—	
4 men, 5 hrs. each at $1.50 a day	3 00
Team, 5 hrs. at $1.00 a day	50

Materials—

8 gals. commercial lime sulphur at 20c.	1 60
8 lbs. Arsenate of lead at 13c.	1 04

4. Second Spraying—

4 men, 4 hrs. each at $1.50 a day	2 40
Team, 4 hrs. at $1.00 a day	40

Material—

4 gals. Lime Sulphur at 20c.	80
12 lbs. Arsenate of Lead at 13c.	1 56

5. Working Orchard—

Hauling brush, man 2 days ($3.00)	
Team 1 day ($1.00)	4 00
Plowing, man and team 1 day at 2.50	2 50
Cultivating, man and team ½ day at 2.50	1 25

Demonstration orchard, Nottawasaga township. John Osborne, Dunedin.

6. Cover crop—

Man and team ½ day at $2.50	1 25
Barley	1 00
Total	$48 30

Returns:

22½ bbls. at $2.50 per bbl.	$56 25
82 bbls. at $3.00 per bbl.	246 00
15 1-6 bbls. culls at 60c.	9 10
	$311 35
Cost of picking and packing 104½ bbls. at 75 cents per bbl.	78 38
Net returns	$232 97

2ND ORCHARD OF 192 TREES.

Expenses:

1. Scraping, 3 days at $1.50	$4 50
2. Pruning, 39 days at $1.50	58 50
3. First Spraying—	
4 men, 18 hrs. each at $1.50	10 80
Team, 18 hrs. at $1.00	1 80
Material—	
40 gals. commercial Lime Sulphur at 20c.	8 00
14 lbs. Arsenate of Lead at 13c.	1 82
4. Second Spraying—	
4 men, 24 hrs. at $1.50 a day	14 40
1 team 24 hrs. at $1.00 a day	2 40
Material—	
22 gals. Lime Sulphur at 20c.	4 40
66 lbs. Arsenate of Lead at 13c.	8 58
5. Working Orchard—	
Hauling brush, man and team 2 days at $2.50	5 00
Plowing, man and team 4 days at $2.50	10 00
Cultivating, man and team 3 days at $2.50	7 50
6. Cover Crop—	
Man and team, 2 days at $2.50	5 00
Buckwheat	1 50
Total	$144 20

Returns:

37 bbls. at $2.50 pe rbbl.	$92 50
129 bbls. at $3.00 per bbl.	387 00
21½ bbls. culls at 60c. net	12 90
30 bbls. windfalls at $1.25 net	37 50
	$529 90
Cost of picking and packing—	
166 bbls. at 75c. per bbl.	124 50
Net returns	$405 40

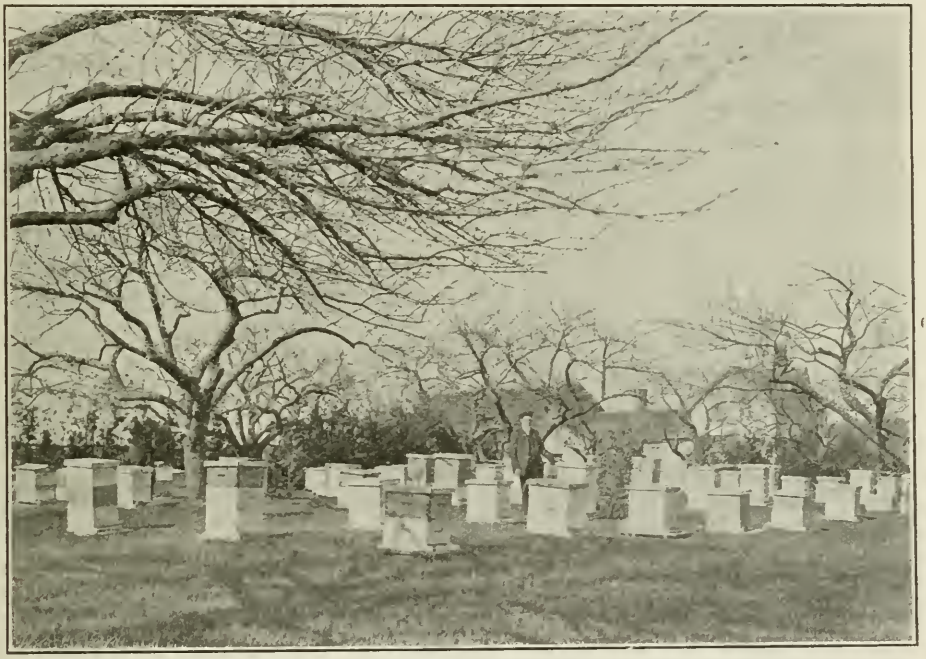
Requests for similar work from many sections have been already made and an extension into other districts will undoubtedly be required.

In two other districts where orchard conditions were somewhat better, representives of this Branch were stationed throughout the season from the time of spraying until the harvesting season began, to give advice to the fruit growers. These men went from orchard to orchard under the direction of the District Representatives holding small meetings or visiting in person the owners, and answering any requests that might be made for advice. In one section, which was badly infested with the San Jose Scale, an expert in the handling of the lime sulphur mixture spent the spring months in demonstrating the making and using of this insecticide, which is now recognized as the best for combatting this pest.

APIARY INSPECTION.

With the discovery of what is known as European or Black Foul Brood in the eastern part of the Province a further re-arrangement of the inspection districts was found necessary to look after the work. Mr. Morley Pettit, Provincial Apiarist, has been given more direct charge of the inspectors, and has spent considerable time personally in investigation and supervision. Sixteen districts were arranged for and the apiaries in these were gone over closely as was permitted by the appropriation which had been voted by the legislature.

It has been found that disease in either of the two forms existent is widespread throughout the Province. Very few of the smaller beekeepers seem able to detect the disease without a visit from the inspector, and even after being shown many of these men will not give the short time required for proper treatment.



Apiary of Homer Burke, Highland Creek.

This has resulted in our inspectors being called back year after year to cases where one or two visits should have been enough; and has handicapped the Department in its work entailing a great deal of expense and loss of time needed for other sections. It is absolutely impossible for these men to visit all of the apiaries in Ontario within the limited time when proper treatment can be given. It would almost seem advisable that the inspectors, where carelessness is shown by the owners of bees, should destroy the colonies rather than leave them to prove a source of infection for the surrounding districts. A list of the divisions and inspectors for 1910 is given herewith:

1. Bruce and Huron—J. S. Schrank, Port Elgin.
2. Waterloo and Perth—D. Chalmers, Poole.
3. Wellington and Grey—John Artley, Blantyre.
4. Lambton, Kent and Essex—W. A. Chrysler, Chatham.

5. Middlesex and Elgin—Jno. Newton, Thamesford.
6. Norfolk, Haldimand and Welland—Jas. Armstrong, Cheapside.
7. Oxford and Brant—W. Bayless, Grand View.
8. Wentworth and Lincoln—Alex. Robertson, Waterdown.
9. Halton, Peel and Dufferin—Arthur Adamson, Erindale.
10. Simcoe and Muskoka—Hy. Johnson, Craighurst.
11. Ontario, York, Victoria and Durham—J. L. Byer, Mount Joy.
12. Peterborough, Northumberland, Hastings, and Prince Edward—W. Scott, Wooler.
13. Lennox and Addington, Frontenac and Leeds—J. B. Checkley, Linden Bank.
14. Renfrew, Lanark and Carlton—R. J. Stead, Lanark.
15. Russell, Prescott and Glengarry—Alex. Dickson, Lancaster.
16. Grenville, Dundas and Stormont—Homer Burke, Tayside.

FRUIT EXHIBITS.

The exhibits directly under the charge of this Branch were again confined to Winnipeg in the west, the Canadian National, and the Ontario Horticultural Exhibitions in Toronto. The western exhibit was in charge of Messrs. Revett, Roadhouse and Lee, of the Department of Agriculture, and proved to be fully up to those of past years. Owing to the tremendous growth of the West and to the rivalry which exists between Ontario, British Columbia and the Western States for this market we will of necessity have to continue our displays of fruit at this point, and should possibly extend to some of the other western exhibitions. With the decided improvement in the packing of our tender fruits and apples that is now taking place, Ontario is in a position to compete on fair grounds with the western fruit growers. Owing to the extension of our orchards the large dealers and co-operative associations are now able to sell either straight or mixed carloads and can quote prices that will compare very favorably with those from the Western States where fruit is raised in large quantities. Our growers are quite willing to take a fair profit on their fruit providing the markets will handle the increased quantities which are now being raised, not only in the Niagara District, but in other parts of the Province as well.

The Winnipeg exhibit was made up of apples held in cold storage from the season of 1909, and tender fruits such as cherries, raspberries, blackberries, currants, and gooseberries of the present season's crop. Many inquiries were received in reference to our fruits and a number of representatives from eastern dealers and associations were present at the time of the Exhibition to meet with possible customers there. Winnipeg is at present the centre of the wholesale fruit business, and on account of the number of railway lines radiating from it will likely continue for many years to be the most important fruit distributing point in the West.

THE CANADIAN NATIONAL EXHIBITION.

The Department of Agriculture was, as usual, represented by a mixed exhibit of fruit, grain, minerals, etc., from the Province generally. Owing to the large number of visitors attracted to this Exposition from outside States and Provinces, it is necessary that such a representative exhibit should be there so as to give

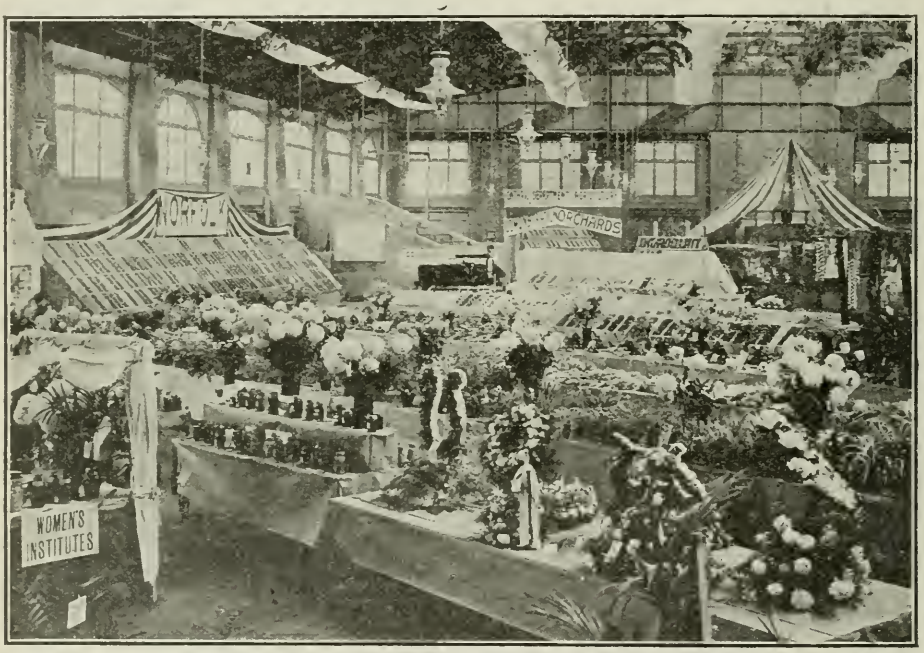
these visitors an idea of what the Province can produce. It is also necessary to make a good display of both fruits and grains to counteract the exodus of our rural population to the West by showing our farmers that we can produce just as good crops here of the kinds grown West, and make as much money. Then we can hope in time to regain some of the ground which we have lost in recent years where statistics show that the population in our towns and cities has been rapidly growing with a corresponding falling off in the country. With fruit lands here much cheaper on the average than in British Columbia or the coast States, and with profits correspondingly high there is no reason why any one from Ontario should leave here to engage in that industry in the West.

A part of the exhibit of the Fruit Branch, Canadian National, 1910.

The exhibit at the Canadian National is not of an educational nature in so far as the fruit grower is concerned, except to show what can be produced. The educational part of the work has been handed over to the Agricultural College at Guelph, which has a large exhibit on the grounds. The fruit exhibit consists of a well-arranged display of the very best fruit of the different kinds raised in Ontario, and is shown to impress, not only the visitors from other countries, but also our own people, with the fact that we can in this Province produce the finest fruit of all kinds that is raised on the American Continent. Any country that can produce the best of fruits will also excel in any other agricultural product.

ONTARIO HORTICULTURAL EXHIBITION.

The seventh annual exhibit, which was held again in November, excelled all of those of past years in the exhibit of boxed fruit. One of the chief aims of the Exhibition when it was organized was to teach our fruit growers the proper methods of packing and handling the standard apple boxes. That rapid development has taken place was well illustrated by the difference between the exhibits held in 1904 and 1910. A great many of the growers are now competing in the numerous classes which call for boxed apples, and in addition quite as many more attend the Exhibition to get a knowledge of the methods required. There are always in attendance at this Exhibition the most up-to-date of our fruit growers, and also those of the Government service who are qualified to give advice



A View at Ontario Horticultural Exhibition, 1910.

as to packages and packing, so that the Show forms the very best opportunity for the fruit grower to secure any information which he may desire in reference to this important part of the industry. That the exhibition is growing in popularity is shown by the increase in the attendance from outside points. While the city of Toronto still furnishes the greater part of those paying admittance at the gate, the railway coupons have shown a very rapid increase during the past three years. The attendance also at the Fruit Growers' Convention, which is held the same time, shows that this week is being looked forward to by the fruit growers of the Province as the one time in the year when they should gather together to discuss matters of importance relating to the industry. The only difficulty now in the way of a still further improvement in both Exhibition and Convention is the lack of suitable hall accommodation at some central point in Toronto. If this can be overcome there is no doubt that future exhibitions will still further represent the improvement which is taking place in fruit growing all through the Province.

FRUIT SHIPMENTS TO GREAT BRITAIN.

The Province of Ontario has been noted for many years for the extent of its export trade in apples with Great Britain, especially with the ports of Liverpool and Glasgow. The season of 1910 was remarkable for the shortage in the apple crop, and as a result the exports dropped to about one-third of the 1909 figures. The amount of the export trade was somewhat influenced by the general scarcity of apples in all of the districts and the consequent increase in the demand for local use. Some of our best sections, notably the Georgian Bay and Lake Huron districts, did not have enough for more than their own use. Prices were correspondingly high, and those sections having apples, even if the quality was poor, were able to make very handsome returns. The shortage in the crop permitted of a large increase in the shipping of boxed apples from the western coast States to the big centres of trade in Great Britain. This increase will likely continue, and Canadian apples will have to compete with these goods, which are generally of magnificent appearance and well packed. The increasing use of the box package for our better class of apples should be encouraged.

A very profitable trade in pears is being worked up in Great Britain, and could be very well increased if the fruit were available. An extended planting of this fruit is recommended. The Burlington district has perhaps led in the trade with Great Britain, and growers there are enlarging their pear orchards. Other districts could quite well go in for the raising of this fruit with profit to the growers.

The 1910 season witnesses the first shipment of peaches to Great Britain on a commercial scale. This Branch in 1909, acting on instructions from the Hon. Mr. Duff, Minister of Agriculture, sent forward a shipment of Elberta peaches to our London agent, who placed the fruit in the hands of Messrs. Parsons & Co., of Covent Garden Market. The reports on the fruit were on the whole favorable, though some criticism was offered on account of the varieties being yellow fleshed instead of white fleshed, as are those grown in Great Britain, France, and South Africa.

As a result of this shipment it was decided to send over a considerable quantity in 1910 of different varieties to determine more definitely what the opportunities were for this trade. The Dominion Department of Agriculture had, as usual, arranged cold storage space for tender fruits on a number of steamers sailing to Great Britain, and had also decided to experiment with shipments of peaches. At first it was thought wise to leave the matter in their hands, simply giving what assistance we could to them in the packing. This was carried out by sending Mr. T. B. Revett, of the Fruit Branch, to help with the putting up of the fruit at the St. Catharines Cold Storage Company's plant, from where the Dominion shipments were made. Later on in the season Mr. C. A. Dobson, of the Jordan Harbor Peach Ranch, requested the help of the Ontario Department in putting out some large shipments to the London market. Mr. Dobson's request was acceded to, and this Branch took charge of the work of picking, packing, and shipping the fruit until the time it was placed on the steamers at Montreal. Messrs. Parsons & Co., of London, England, handled the goods on their arrival at that port.

The peaches, consisting largely of Crawfords and Elbertas, were packed in small cases holding from 15 to 25 fruits, a layer of wood wool was placed in the bottom and top and each peach, after being wrapped in fine paper, was surrounded with a roll of the wood wool. The packing as reported on by the receivers was pro-

nounced perfect and fully equal to that of the South African shippers who had been sending peaches forward to London for some years. The fruit sold at from 3s. 6d. to 8s. per case. If these prices could be maintained it would mean a very fair profit to the shipper. The chief difficulty lies in the cold storage on the steamers, one shipment of 700 cases being seriously damaged by leakage from the brine pipes, due to a too sudden change in the temperature as the boat approached the other side. On the whole the shipments were fairly satisfactory and will likely be continued in 1911. It is a trade that would, however, be largely in the hands of large growers or co-operative associations that could get together a considerable quantity of fruit on short notice.

One of the most important points in connection with the shipments was the obtaining of a good grade of wood wool. This Branch, through our London office, imported two tons of very fine aspen wood wool manufactured in Norway. This material was very soft and absolutely odorless. Enough was obtained to supply the shipments for both the Dominion and Provincial Departments. The former tried to use a layer of the Ontario made wood wool for padding the top and bottom of the case, but reports received from Great Britain state that the fruit was more or less tainted as a result.

The shipments from St. Catharines consisted of 1,284 cases, which were shipped to a number of points in Great Britain. The Jordan Harbor shipments were 2,400 cases, all of which were sent direct to Parsons & Co., of Covent Garden, and from there distributed to points in the British Isles and on the Continent.

HORTICULTURAL EXPERIMENT STATION.

The work at this Station during the past season was somewhat deranged owing to the illness and death of the Director, Mr. H. S. Peart. Mr. Peart had been in charge of the Farm since it was taken over by the Department from Mr. M. F. Rittenhouse. He had been largely responsible for the carrying out of the planting of the orchards as directed by the Advisory Board appointed by the Department, and was in very close touch with the experiments which had been outlined. It was the intention to continue the plantings during the spring of 1910, so as to complete all the experiments in hand, but under the circumstances this was not carried out. Mr. A. J. Logsdail, expert in plant breeding, acted as Director of the Station until the appointment of Mr. A. D. Harkness, of Irena, in December. Owing to the work that this entailed on Mr. Logsdail his own plans for the plant breeding were more or less interfered with. Mr. Logsdail has, however, given in this report a brief summary of the results of the year's work.

With the change in the staff, the Minister of Agriculture has also made a slight alteration in the supervision of the work there. Mr. Harkness will be superintendent and Mr. Logsdail expert in plant breeding, both directly responsible to the Director of this Branch. This change was decided upon to keep the Department here in closer touch with the work and expenditure on the farm.

With the tender fruit orchards coming rapidly into bearing, it is hoped that something of value to the fruit growers of that district will soon be determined upon as a result of the experiments already begun. In connection with the plant breeding work a specialty has been made of strawberries, and the coming season will see about twenty thousand plants growing for testing purposes. Quite a large number of other fruits are also being brought on. A completion of the planting and the erection of a fruit house will be necessary for the season of 1911.

NURSERY INSPECTION.

In the year 1909 the Fruit Branch made a special inspection of all nursery stock grown in the Niagara District, with a view to finding out what percentage of stock was infested with the San Jose Scale and other fruit tree pests. Owing to the prevalence of the scale in this district it was though better to continue the inspection in 1910 and in following years. Unfortunately, however, the necessity for an early inspection of stock for the Brown Tail Moth used up a large part of our appropriation, and it was decided to discontinue the later inspection for San Jose Scale for the season. A further appropriation for this work will be asked for, so that the summer inspection of stock can be resumed in 1911.

Our local inspectors were directed to spend as much time as was available in clearing up infested orchards, and seedling trees in the neighborhood of the blocks of nursery stock. As the latter are removed at frequent intervals the spread of the scale in the nursery would not be serious if it was possible to prevent reinfestation. A considerable cleaning up of these places was effected, but there still remains quite a bit of it to be done. The chief difficulty is that many of the local inspectors are not given the moral backing required from the fruit growers in the section, and are afraid to enforce the regulations of the Department. Our chief inspector has received instructions personally to supervise this work, and we hope within a short time to place the nurseries in a much better position in this respect.

Further help was provided in inspecting the fumigation of stock both for spring and fall digging. Every year, however, we receive reports of orchards recently planted that have been found with scale on the young trees. In most cases, so far these have come from our Ontario nurseries, and show either carelessness or disregard of the law. The proper fumigation has proven by numerous experiments to be absolutely fatal to scale in any stage of its existence, and the endeavor of the Department will be to see that treatment of the stock is properly carried out. Four inspectors devoted their whole time to this work in the spring and fall of the past year.

Local inspectors under the Fruit Pests' Act were again appointed in most of the tender fruit growing districts, and also in some of the apple growing sections. A list of the inspectors and their districts is given herewith:

Township.	Inspector.
Thorold	Albert Nelson, Fonthill.
Niagara	Theodore Brooker, Virgil.
Saltfleet	W. E. Biggar, J. P. Vanwagner, Bartonville.
Clinton	John Reid, Chas. Watson, Beamsville;
North Grimbsy	J. M. Kelson, A. T. Hunter, H. L. Walker, Grimsby.
Barton	Harry F. Burkholder, Bartonville.
Louth	E. J. Fisher, A. D. Broderick, Lewis Haynes, St. Catharines.
Walkerville	J. B. Forrest, Walkerville.
St. Catharines	Wm. Elliott, St. Catharines.
Grantham	Norman Foster, Port Dalhousie.
Leamington Town	Wm. Roadhouse, Leamington.
Pelham	Harry Arnold, Ridgeville.
Middleton	J. G. Herron, Courtland.
Derby Township	Henry Hilts, Owen Sound.
Beamsville Village	Frank Culp, Beamsville.

A request was made to the Department during the year that these local inspectors be appointed by this Department, the system of pay to be the same as at present, *i.e.*, one-half the expense to be borne by the townships and the other half

by the Province. The feeling among some of the fruit growers was that if outside inspectors could be appointed the law would be more strictly enforced. On the other hand, there existed a feeling in many quarters that a local inspector, if properly backed up by public opinion, would do better work, as he would be better acquainted with the district in which he was living.

The matter was discussed at three different meetings of the Niagara Peninsula Fruit Growers' Association, which represents the Niagara fruit growing section, and it was decided that the fruit growers make an effort the coming season to have the very best men available appointed for the positions, and to back up their work in every way possible by the influence of the district association. It is hoped in this way to secure a better enforcement of the Act during the coming season.

Sour Cherries in Norfolk County intercropped with Tomatoes.

ORCHARD SURVEYS.

This term has been applied in the United States to a careful census made of the orchards in certain districts. The plan consists in sending one or more men with a knowledge of horticultural conditions to visit all of the orchards in a district, securing from the owners detailed information concerning the trees. Such information is afterwards compiled and the results given out in bulletin form to show just what conditions along all lines of orchard practice have given the most satisfactory results. The States of New York and Oregon have gone to considerable trouble to compile these resports from a number of their best fruit districts.

In the years 1909 and 1910 Prof. J. W. Crow, of the Agricultural College at Guelph, in co-operation with this Branch, arranged for surveys to be made in the Counties of Simcoe, Huron, Lambton, Elgin, Lincoln, Wentworth, Durham, Northumberland, and Prince Edward. The field work was placed in the hands of students of the College, who, during the summer vacation, visited all of the orchards in these districts, making a detailed report on each farm. To show how thoroughly this was done a copy of the form used is given herewith.

Owner..... No.....

P. O..... Date .....

County ..... Township.....

ORCHARD SURVEY

ONTARIO DEPT. OF AGRICULTURE
AND
ONTARIO AGRICULTURAL COLLEGE

Location.....Acres in farm.....Acres in fruit.....	Kind of fruit.	No. bearing.	Age of bearing	No. non-bearing	Distance	Acres
Site.....Aspect.....						

Planting plan.....Nature of other crops.....

Varieties.....

Type of Soil.....Depth.....Subsoil.....Drainage.....

Tillage—Kind and Frequency.....

Cover Crop.....No. of Years.....

If Sod—Kind.....No. Years.....Method Treatment .....

Fertilizers—Kind.....Quality .....Frequency .....

Pruning—Time.....Method.....Frequency ....Severity.....

Thinning .....

Spraying—Machinery .....Mixtures and Times of Applying.....

.....

Diseases .....

Insects .....

Present Condition.....

Packages.....Packing .....

	19	19	19	19	Where and How Sold .....
Yields.....					
Price.....					
Income per Acre.....					

Remarks.....

.....Observer .....

With the information obtained the reports of the work were prepared and are printed as part of this volume. The Counties of Simcoe and Kent were not completed, and for the present are not printed.

The results as shown here prove very clearly, by comparison between different blocks of orchard treated under different methods, the value of proper care of both soil and tree. A careful study of the tables will prove of interest to all of our fruit growers, not only those residing in the counties mentioned, but in other parts of the Province. These districts are typical of conditions existing everywhere along the Great Lakes, where the bulk of the fruit is at present grown. A further study of counties inland and along the St. Lawrence and Ottawa Valleys will be necessary to complete the work.

Hoeing young nursery stock near Fonthill.

CO-OPERATIVE WORK.

The short crop of apples which was quite general over the Province resulted in the formation of very few new associations during the past year. This was specially true in the western part of the Province, where co-operation has been most successful. However, those already in existence have strengthened their membership in most cases, and as a result of the poor crop were able to sell their fruit at very good prices. The Norfolk Fruit Growers' Association, with a large membership, handled over 36,000 barrels of marketable apples, besides selling thousands of dollars worth of low grade apples to the canneries and evaporators. This Association showed a remarkable increase in membership, and with a full crop would undoubtedly handle close on to a hundred thousand barrels of apples.

The Niagara Peninsula is now well organized from Stony Creek through to the Niagara River. During the season the recently organized Ontario and Western Association handled a large quantity of fruit from their membership, which extends from Stony Creek through to Beamsville. The presence of the Hamilton, Grimsby, and Beamsville Electric Line has aided them greatly in their work.

This Association is doing for the western end of the peninsula what the St. Catharines Cold Storage Company has already done for the eastern portion. Both Associations are handling large quantities of fruit growers' supplies, and later looking after the sale of the fruit. The O. & W. is endeavoring to pack a large quantity of the fruit in small packing houses distributed along the line of the electric railway, and should be able to put out a more uniform article than where the bulk of the fruit is still packed by the individual member. In addition to these two large associations there are three other smaller ones, located at Winona, Grimsby and Jordan, and these, with a number of large dealers, furnish the fruit growers of the Niagara Peninsula with an excellent outlet for all kinds of fruit. With good markets close at hand this favored district should continue to show a big increase in the production of fruits, especially of the tender kinds, and as a result higher prices even yet for the lands throughout the section.

A revised list of Associations, with secretaries or managers, is given herewith:

CO-OPERATIVE FRUIT GROWERS' ASSOCIATION.

1. Arkona Fruit Growers' Association .....T. A. Lampman, R. F. D., Thedford
2. Brant Packing Association .....F. M. Lewis, Burford.
3. Chatham Fruit Growers' Association .....A. McGetchie, Chatham.
4. Georgian Bay Fruit Growers' Limited .....G. H. Mitchell, Thornbury.
5. Gore Fruit Growers' Association .....B. J. Palmer, New Durham.
6. Newcastle Fruit Growers' & Forwarding Assn. ..W. H. Gibson, Newcastle.
7. Norfolk Fruit Growers' Association .....Jas. E. Johnson, Simcoe.
8. Oshawa Fruit Growers' Association .....Elmer Lick, Oshawa.
9. Owen Sound Fruit Co., Limited .....Adam Brown, Owen Sound.
10. Sparta Fruit Growers' Association .....J. A. Webster, Sparta.
11. Watford Fruit Growers' Association .....D. G. Parker, Watford.
12. Grafton Fruit Growers' Association .....J. G. Wait, Wicklow.
13. Alvinston Fruit Growers' Association .....E. F. Augustine, Aughrim.
14. Burgessville Fruit Growers' & Forwarding Assn. .W. H. Kneal, Burgessville.
15. Canadian Apple Exporters, Limited .....F. B. Mallory, Frankford.
16. Cobourg Fruit Growers' Association .....S. W. Staples, Baltimore.
17. Hatchley Station Fruit Growers' Association ....W. F. Robinson, Hatchley Station.
18. Mount Nemo Fruit Growers' Association .....R. M. Spence, Nelson.
19. Orono Fruit Growers' Association .....E. J. Hamm, Orono.
20. Forest Fruit Growers' & Forwarding Co. .....D. Johnson, Forest.
21. Jordan Co-operative Association .....J. A. Wills, Jordan.
22. St. Catharines Cold Storage & Forwarding Co. ..Robt. Thompson, St. Catharines.
23. Ontario & Western Co-operative Fruit Growers' Co.C. J. McCallum, Grimsby.
24. Wyoming Fruit Growers' Association .....E. J. Borrowman, Wyoming.
25. Prince Edward Fruit Growers' Association .....Philip Greer, Wellington.
27. Georgetown Fruit Growers' Association .....W. F. Bradley, Georgetown.
27. Lambton Fruit Growers' Co-operative Assn. ....George French, Sarnia.

As requests for information on co-operative work were so frequent, it was decided to publish a special bulletin on the subject. Mr. S. E. Todd, the Representative of the Department at Petrolia, who has made a special study of co-operation for a number of years, prepared the bulletin (No. 192). It contains complete information on organization and the carrying on of co-operative buying and selling in all lines of agricultural products, but with special reference to fruits.

HORTICULTURAL EXPERIMENT STATION, JORDAN HARBOR.

VEGETABLES.

A. J. Logsdail, B.S.A., Jordan Harbor.

The work with vegetables during the past year has been almost entirely confined to the testing of a large number of varieties of the more important market garden crops, such as: Beans, beets, carrots, lettuce, peas, peppers, sweet corn and tomatoes.

Nearly eighty varieties of beans were grown during the past season. A fifty-foot row of each of the varieties was sown on the same date, and a record was kept of the most important features. The list given below includes eighteen of the most satisfactory varieties, with their respective yields (in ounces), and the season of bearing, namely, Early, Medium or Late.

BEANS, 1910.

Name of Variety.	Season.	Yield.
Davie's White Kidney Wax	Early.	329 ozs.
Early Valentine	Early.	320 "
Early Mohawk	Early.	314 "
Dawson's Horticultural Wax	Early.	275 "
Henderson's Bountiful	Early.	240½ "
Michigan White Wax	Early.	216½ "
Green Pod, Dwarf	Medium.	400 "
Stringless Green Pod	Medium.	338 "
Scarlet Flagelot Wax	Medium.	270½ "
Giant Yosemite	Medium.	259 "
Early China	Medium.	233½ "
California Rust Proof	Medium.	231½ "
Refugee Wax	Late.	442 "
Burpee's White Wax	Late.	399 "
Rennie's Stringless	Late.	341 "
New California Wax	Late.	303 "
Michigan Wonder	Late.	293 "
Emerald Beauty	Late.	292 "

In order of yield, the ten most satisfactory varieties were: Refugee Wax, Green Pod Dwarf, Burpee's White Wax, Rennie's Stringless, Stringless Green Pod, Silver Bush, Davie's White Kidney Wax, Early Valentine, Early Mohawk, and Triumph of the Frames.

A similar experiment was conducted with about sixty varieties of peas. This crop was by no means satisfactory, owing to the nature of the soil in which it was grown, and the general method of growing.

In order that the best results may be obtained from a crop of garden peas, the soil should be quite rich, and a soil mulch should be maintained throughout the whole period of growth; tall growing varieties should be given support in the nature of a trellis of wire or sticks, and the rows should be further apart than those of the dwarf varieties. Many of these factors were unavoidably neglected, but it is hoped that by the system to be followed during the coming season these features will be almost, if not entirely, eliminated.

Exhibit of apples at Ontario Horticultural Exhibition, 1910.

In the list of peas given below are included twenty of the most satisfactory varieties, together with brief notes regarding the relative size of pea and pod, the season of yield, and the quantity of the crop of each of the varieties:

PEAS, 1910.

Name of variety.	Size of Pea.	Size of Pod.	Date of bearing.	Total yield.
Premium Gem	Medium.	Medium.	Very early.	138 ozs.
American Wonder	Small.	Medium.	Very early.	116½ "
Extra Early Premium Gem	Mid-Small.	Medium.	Early.	108½ "
Rennie's Best Extra Early	Small.	Small.	Early.	92 "
Alaska	Medium.	Medium.	Early.	91½ "
Early Conqueror	Medium.	Small.	Early.	90 "
Burpee's Quality	Medium.	Small.	Mid-season.	142 "
Little Marvel	Medium.	Medium.	Mid-season.	137 "
Bruce's Royal	Large.	Large.	Mid-season.	107 "
Little Gem	Medium.	Medium.	Mid-season.	102½ "
Nott's Excelsior	Medium.	Small.	Mid-season.	101½ "
Sutton's Gem	Large.	Large.	Mid-season.	96½ "
Abundance	Small.	Medium.	Late.	188 "
Yorkshire Hero	Large.	Medium.	Very late.	165 "
Lincoln	Medium	Large.	Late.	164 "
Heroine	Large.	Medium.	Very late.	162 "
Senator	Medium.	Large.	Late.	158 "
Dwarf Telephone	Large.	Large.	Very late.	158 "
Fillbasket	Large.	Large.	Late.	154 "

The ten best varieties with regard to quality, yield and season were:

For Early Season: Premium Gem and American Wonder.

For Mid-Season: Little Marvel, Bruce's Royal and Burpee's Quality.

For Late Season: Yorkshire Hero, Dwarf Telephone and Fillbasket.

Ten varieties of beets are given in order of their respective yields, with a brief note on the size, color and texture of each:

BEETS, 1910.

Name of variety.	Colour.	Size.	Texture.	Total yield.
Whitehqm Fireball	White.	4 inch.	Tender.	32 lbs.
Improved Blood Turnip	Light red.	4 "	Tender.	30 "
New Intermediate	Dark red.	3 "	Fairly tender.	30 "
Philadelphia Turnip	White.	4 "	Coarse.	29 "
Rennie's Globe	Dark red.	4 "	Tender.	27 "
Albano or Market Garden	Light red.	4½ "	Tender.	26 "
Rennie's Intermediate	Dark red.	3 "	Tender.	24 "
Rawson's Arlington Favourite	" "	3½ "	Tender.	24 "
Crimson Globe	Bright red.	3 "	Tender.	24 "
Extra Early Turnip	Light red.	4 "	Coarse.	23 "

Several alterations have been planned for the coming summer's work, and with the incorporation of these modifications, it is hoped that the results obtained from the competitive trials of varieties may demonstrate more accurately the relative merits and demerits of the several varieties under experimentation.

The number of distinctive plots will be largely reduced, but the varieties deemed worthy of further trial will be grown on a more extensive scale, together with a selection of the most promising novelties of that or the preceding year.

Not only will a greater number of plants give a more accurate average of the true merits of any one variety, but they will facilitate the very necessary work of becoming intimately acquainted with the characteristics of the variety. Moreover, sufficient product can thus be obtained at one picking to enable an individual canning test to be made of each.

With regard to this last feature of the experimental work, it is interesting to note that the variety of tomato, known as Earliana, gave excellent results in the canning test, despite the fact that this tomato is considered of little use for canning purposes.

PLANT BREEDING.

A. J. Logsdail, Jordan Harbor.

The progress during the past year in the work of plant breeding and selection has largely consisted in extending the possible utility of this phase of investigation, and increasing the number of plants with which to carry on future selection.

A bed of about 3,000 seedling strawberries fruited for the first time. A careful record was made of each plant, the following data being noted, with regard to blossom: Sex—Whether pistillate or bisexual. Size—Quantity of pollen, date of first blossom, full blossom, last blossom, and whether the blossoms were numerous or otherwise. With regard to the fruit: Size, shape, color, flavor, texture (whether firm or soft), the position of the fruit (whether recumbent or semi-erect), and the dates of first fruit, main crop, and last fruit. Several other factors were noted with regard to the foliage, seeds and runners.

This work will be carried on with the same plants for another season, and similar data will be collected from the progeny of these plants; by so doing it is hoped that some valuable information may be obtained regarding the transmitability of the characters of strawberries. Several plants of definite types were selected for further breeding and improvement, and a large number of seedlings (about 12,000) were propagated from the most promising strains.

These plants are all grown in the hill system, and I will briefly explain the reason this system is followed, because commercial practice of growing the plants in a matted row is the method more generally adopted.

A number of strawberry plants raised from seed will show great variation and a general tendency to revert to more primitive types. Occasionally one plant will appear developing characteristics which are of significant commercial value and warrant retention. The hill system enables each plant to form a hill of runners very similar to itself, without intermingling with either poorer or better forms. The poorer plants are then destroyed, and those that are considered of sufficient value for further selection are retained and multiplied until a sufficient number of runners have been produced for planting in a matted row and testing beside standard varieties.

The second reason is to facilitate the work of selection. A plant growing under such conditions will develop its individual characteristics to a more marked degree than when grown in a matter row, and is thereby more easily distinguished from the surrounding plants of inferior strain.

The plant breeding work with tomatoes has been divided into two main divisions. The first comprises the cross breeding of standard varieties, with the object, firstly, of obtaining a meaty, early bearing fruit suitable for canning pur-

poses, and, secondly, an early bearing, high quality, tomato, with a skin sufficiently tough to recommend it as a fruit for long distance shipments.

The second phase of this branch of the work consists in testing selected strains of Earliana, of which we now possess five distinct types.

The Central Experiment Farm Strain has so far given the most satisfactory results, yielding a heavy crop of smooth fruit, earlier than the other types. This strain has been selected for a number of years, and is now fairly established, as evidenced by the fact that seed of our own saving from this strain the previous season proved equally as good as seed procured the same season from Ottawa.

Investigation is also being carried on with regard to the transmitability of the characteristics of this fruit. With this object in view several varieties possessing

An up-to-date peach orchard near Winona.

certain clearly distinguishable features were self-fertilized during the season of 1909, and last year, 1910, were crossed with each other. The seed of these hybrids will be grown this year, and records taken of the features of each plant.

A number of seedling peaches, apples, and grapes will be planted in orchard and grapery this spring. Seedlings of peaches and grapes, procured at later dates, are making satisfactory progress.

With regard to grapes, a number of crosses were made between varieties of the European Grape (*Vitis Vinifera*), with grapes of American origin, as Concord and Worden (*Labrusca*), and grapes of hybrid origin, Wilder and Lindley (*Labrusca x. Vinifera*), with the object of obtaining a sweeter grape, more nearly approaching the *V. Vinifera* type, yet of sufficient hardness to withstand climatic conditions, and a growth typical of the American species, and capable of withstanding the attack of mildews.

EXPERIMENTAL WORK WITH BEANS.

At the request of the bean growers of the Western Peninsula the Department undertook to conduct some special experiments with this crop on the farm of Mr. Matthew Wade, of Morpeth, in Kent County. There seems to have been a falling off in the production per acre, and the growers differed as to the causes, some believing it to be due to attacks of insect pests or fungous diseases; some to lack of vitality in the seed, while others felt that some special mineral element was becoming exhausted in the soil. Seed was imported from some of the best bean districts in the United States, but as a result of the experiments did not show any improvement over selected Ontario seed. The experiments will be continued for some time, and it is hoped that the problems presented by the growers will be solved.

In connection with the work an Ontario Bean Growers' Association has been organized, with David Wilson, Morpeth, as secretary. The aims of the Association are to advance the bean growing industry in every possible way through co-operation with this Department, and by the offering of prizes for the best fields of grain in the western part of the Province, where the bulk of the crop is now grown. In this connection the various township and county councils have given liberal prizes, while the expenses in connection with the judging have been borne by the Department of Agriculture.

The acreage devoted to this crop in Ontario, as given by the last Dominion census in 1901, shows 42,013 out of a total of 46,445 acres for the Dominion of Canada. The production in bushels was 765,818 for the Province, as compared with 856,720 for the Dominion. Of these totals the Counties of Kent and Elgin have an acreage of 33,470, and a production of 636,536 bushels, practically controlling the market. Most of the work, therefore, will be carried out in these two counties.

LAKE HURON FRUIT EXPERIMENT STATION.

A. E. Sherrington, Walkerton.

The spring of 1910 opened very early. The weather during March was as warm as June, the temperature at times being 80 deg. F. in the shade. This warm weather induced rapid growth, resulting in serious damage to foliage and blossom by the cold, wet spell which immediately followed. This cold, wet spell continued right through the blooming period, causing a total failure of the apple crop throughout this district, especially in old orchards. Golden Russets suffered the most. The frost-damaged leaves appeared to be all the more damaged by a fungus which stripped them of almost all their leaves. In the young experimental apple orchard we had quite a crop of apples. Transparent, Duchess, Wealthy, Peter, Salome, Ben Davis, and McIntosh gave the largest yields. We again undertook to test the commercial lime-sulphur and Bordeaux mixtures as fungicides. For this purpose the orchard was divided into two parts. Lime-sulphur was used at a strength of 1 to 40, with the addition of 2 pounds of arsenate of lead. The Bordeaux was used at a strength of 4 pounds copper sulphate (bluestone), 6 pounds lime and 2 pounds arsenate of lead to 40 gallons water. The first spraying took place just before the blossom buds opened, May 3rd, with Bordeaux in one part and lime-sulphur used in the other on May 6th. The next spraying was done June 3rd, just after all the blossoms had fallen. The third spraying took place from ten

days to two weeks later. The results were very satisfactory. The apples in the young orchard were clean and free from worms and a good crop. What few apples there were in the old orchard were clean and free from worms. I cannot see any difference in the results of lime-sulphur versus Bordeaux as a fungicide. The lime-sulphur is less troublesome to prepare and more easily applied. Arsenate of lead is a much more superior insecticide than Paris green, both for fruit trees and potatoes.

Fungi.

Fungous diseases were not nearly as prevalent this season as usual, excepting on the apple leaves that were damaged by frost.

Insects.

Orchard insects were conspicuous by their absence. A few codling moths were seen, but did little damage. June bugs were very scarce this season, and it is to be hoped they never appear again.

Apples.

As stated in general notes the apple crop was about a total failure here, excepting the young orchards, which did not seem to be affected by the blight, as it is called. There is not as much activity in planting here as in some districts, still quite a few good orchards are being planted, mostly from five to ten acres. The variety that is being planted is the Spy, and I should not advise the planting of many of any other variety in this district.

Pears.

Pears are not grown extensively in this district. Although the orchard has been singularly free from blight this year, and despite the fact that it has thrived more this year than heretofore, very little fruit has been harvested. Clapp's Favorite, Bartlett, Lawrence, Josephine and Bartlett Seckel are about the best varieties.

Plums.

The plum crop was good this season, of excellent quality and sold for high prices. We had very little rot, a few varieties, such as Victoria and Gueii, being the most subject to this disease. The plums were sprayed with either copper sulphate at the rate or 2 to 3 lbs. to the 40 gallons of water or Bordeaux just before buds burst; the next spraying just before the blossoms open, and the third soon after the blossoms fall. The third spraying is applied when the fruit is about half grown. Bordeaux was used at all of these sprayings. Under this method we do not have much loss from rot. All European varieties have succeeded very well here. The Japan varieties have failed, except the Burbank. Another one or two hundred trees will be planted next spring, consisting of the following varieties: Quackenbos, Bradshaw or Niagara, Shippers Pride, H. R. P. Egg, Monarch, Grand Duke, Reine Claude, and German Prune. Our system of pruning plums has been the removal of any limbs that may be crowding or crossing one another, keeping the trees moderately thin and heading back all previous seasons' growth from one-third to two-thirds. This gives us a strong, stocky tree.

Cherries.

Cherries, like the apples, were very scarce; in fact, a total failure. However, the orchard is doing fine. The Yellow Spanish, Early Richmond and Montmorency

are the best varieties. Windsor is doing better now than heretofore. The system of pruning cherries is simply to keep the trees from getting too thick. Very little pruning is necessary after the trees commence to bear.

Raspberries.

The crop of raspberries was not as heavy this season as a year ago, mostly owing to the canes being broken down by the snow and the dry weather during the fruiting season. The quality was excellent and prices good. Another acre was planted to red raspberries this last spring. The demand for raspberries has increased greatly the last year or two, and should prove a profitable crop. The varieties grown are Marlboro', the first to ripen; Herbert, next in season, and Cuthbert, the best of all. Cuthbert is still our favorite. It is a strong grower and good cropper and a first-class shipper. The Herbert is doing well. It is the heaviest yielder and the fruit is very large, but rather soft for distant markets, but the demand is still for Cuthberts. Marlboro' is doing better with us now than formerly, possibly because it is on higher land. Very few blackcaps are now grown—only about 600 plants in all. Conrath and Hilborn are two varieties and are planted in rows six feet apart, thoroughly cultivated and fertilized with barnyard manure and wood ashes.

Blackberries.

The blackberries are all discarded as unprofitable in this district.

Currants.

We have about 35 varieties of red and black currants and about 1,000 bushes in the plot. The crop of red currants was good, but blacks were rather light, although of good quality. Shallow cultivation is practiced here for all small fruit, the currants are well manured and pruned once a year. Our best varieties of reds are: Cherry Fays, Wilder, Perfection and Prince Albert. Blacks: Champions and Naples are the best. We have sixteen varieties of Dr. Saunders' hybrids, quite a number of which are very promising.

Gooseberries.

We have somewhat over 1,000 bushes of gooseberries. The crop this year was not quite as heavy as usual, but the quality was good and prices fair. About sixteen varieties are grown, but the standard commercial sorts are Downing and Pearl. The English varieties here are very susceptible to mildew. The lime and sulphur, in some cases, has helped to keep it in check, but not wholly so.

Strawberries.

We have now four acres of strawberries and about twelve varieties under test for next year. The crop was light this season owing to dry weather during the fruiting season. Brandywine, Williams and Glen Mary have been our most productive and profitable varieties.

SOUTH WESTERN FRUIT EXPERIMENT STATION.

J. L. Hilborn, Leamington.

The season of 1910 was a very favorable one in most respects for this district. The chief exception being an unusually severe hailstorm on August 10th, which did great damage in some sections, and as this station was in the midst of the affected district it got its full share.

Up to the date of this storm the season gave promise of being one of the best ever known here, for most crops. As the storm was the most severe ever witnessed by anyone whom I have heard express an opinion on it, much damage was done in the small area where its force was most severe.

In the winter of 1909 and 1910 we had a good fall of snow early in the season, which was well distributed, and kept the land well covered through the winter, as a result of which fruit bushes and trees came through the winter in excellent condition.

The month of March was unusually bright and warm, so much so that the fruit buds, particularly on the peach trees were much swollen before any one was ready for spraying.

As the San Jose scale has become quite troublesome here, all fruit growers worthy of the name spray regularly every spring for that pest. As I was not well satisfied with the Commercial brand of lime sulphur used in 1909, I resolved to do my own manufacturing in 1910, but before any spraying materials could be secured the fruit buds on the peach trees had become quite large, so much so that I feared it was too late for the control of the curl leaf. However we made a rush at it as soon as material could be secured, and as the Elberta is so readily affected by the curl, we sprayed these first, and gave them a thorough application, with the result that the curl was completely controlled on these and all other trees on the Station farm, except in a few cases where the work was not as thoroughly done as it should have been, owing to the necessity for haste on account of the buds developing so early. Results of the past season were such as to add more proof (if that was necessary) to what I have claimed each year, that, the home boiled lime sulphur wash, the commercial solution or the vitriol solution, will entirely control the curl leaf, if it is thoroughly applied and done in time, say before April 10th in ordinary seasons.

Peach trees of nearly all varieties that were old enough to bear, produced a full crop this season, but in this immediate vicinity the fruit was quite badly marked by hail, and about the time that the first good varieties were preparing to ripen, we had a severe wind and rain storm which so swayed the trees that much of the fruit was again bruised, and as the weather continued damp and warm much of this fruit rotted on the trees before it was ripe enough to harvest. This happened with New Prolific, Engol, Kalamazoo and other of our very best varieties that were never known to rot before. About the time these varieties were all off the weather became cooler and fine, and later varieties ripened up in fine shape, but the quantity was not as good as in former seasons.

At this station we have one block of peaches of some two acres planted to Golden Drop and Banner, with a few Engol and Kalamazoo. This block was planted in 1904, 15 by 18 feet apart, and has produced a full crop in each of the last three years. It has been headed back and thinned each season since planting and given good cultivation. The last two seasons much thinning of the fruit was necessary, especially of the Golden Drop, which was about one-half removed, but when harvesting the crop we decided that it would have been better had more been removed when thinning.

A view from the lower ridge east of Grimsby Park, Niagara district.

Still about 70 per cent of the Golden Drop (which is smallest of any) were large enough that three rows would fill the ordinary eleven quart basket. We secured this size, in spite of the fact that the branches of the trees meet either way in the rows, and that we had a very severe drouth through July which was not broken until August 10th. A good, thrifty growth was maintained through this severe drouth by stirring the soil about three times per week. As the straw mulch which we apply beneath the trees for winter protection, etc., covers about 30 per cent of the area, and this directly about the trees, all of the soil not covered by this mulch is easily and quickly stirred with our orchard implements.

It was very noticeable, however, that wherever a tree has failed and had been removed, those about this blank showed extra vigor and fruit was larger. As these trees had produced a heavy crop three years in succession, and well repaid their cost, we decided to practise some thinning; therefore we went over about 70 per cent of this block, after the crop was off, and removed each alternate tree in each alternate row. This was done by first cutting off the branches then by using a good team assisted a little by a man with a spade, the stumps were entirely removed, which will give the surrounding trees more root space. The alternate tree in the remaining full row as well as the 30 per cent of orchard which was left in one corner without thinning will be pruned more severely than the rest by dehorning a portion of each tree. By continuing this method for several seasons, we hope to be able to judge which is better, to remove alternate trees when too thick or thin by dehorning. So far as I can judge, from my own experience, an orchard planted at this distance and thinned out by either method, when it becomes necessary, would yield much more fruit than one planted wide enough apart that the trees will have room enough when they are fully developed.

Another block containing some two hundred trees (Banners) planted in 1907, sown to hairy vetch in 1908, which grew to a great size by late May, 1909, when it was plowed under, and this gave an immense start to the trees, and this season they produced three to five baskets each, of the largest and finest peaches I have seen of this variety, and again made a good growth. These trees are planted 16 by 18 feet apart, and some of the branches are meeting in the narrower spaces, although they have been cut back about one-third of the growth each season. This orchard was started with rather small No. 2 trees, and made only a moderate growth the first two seasons. The greater portion of the peach trees planted for variety test are growing well and some of them have borne a little, but have not fruited enough yet to report on. I have about forty trees of a new variety budded from a seedling grown in a Leamington garden. These trees are now three years, and they produced a small quantity of the finest peaches that I saw this season. This variety will be watched with great interest.

Of the thoroughly tested sorts, I would name the following as the best seven varieties: New Prolific, Engol, Kalamazoo, Elberta, Banner, Golden Drop, and Lemon. This applies to our sandy soil. Back from the lake where the soil is heavier, I would add to this list St. John, Garfield, and some others of the Crawford type.

I shall continue to mulch all peach trees with straw, or other coarse material, and several of my neighbors are now adopting that method. We have about thirty peach trees which were budded on plum roots that are growing fairly well. These are left without mulch, to test this hardiness should we get another severe winter. Peaches are again being quite largely planted in this county.

Plums.

Eighteen varieties of plums were planted in 1907 for experiment. Only two or three varieties have shown any fruit yet, and only one sort, Shiro, has shown enough to report on. This variety had considerable fruit on it last season, and this year again each tree produced about six quarts of medium-sized, nice-looking plums of fair quality; bright yellow.

The old orchard of Burbank plums on the Station Farm bore a light crop of very large, fine fruit, but as it was just beginning to ripen when the hail storm arrived, and the greater portion of the fruit was destroyed. Very few plums are grown in this county—not nearly enough to supply local demand.

Blackberries.

The varieties of blackberries reported on last season were all fruited again this season. The Mersereau was far ahead of all others this season as well as last year. Judging from these two seasons it is the blackberry of all others to plant here, being hardy, free from rust, of good size and more capable of resisting drouth than any variety yet tested here. We had about two acres of this sort in bearing this season. It is less affected by drouth than any blackberry I have ever grown.

Raspberries.

Raspberries are but little grown in this County. For the past few years growers have ceased to cultivate them on account of the difficulty of securing pickers to harvest the crop.

The few grown at the station for variety test bore a heavy crop again in 1910. They are mostly of the black varieties. Kansas did best of any again this season, followed by Hilborn, Galt, and Palmer. Columbia again produced a large crop of purple fruit of peculiar flavor, much admired by some and disliked by others.

Currants.

To my mind the production of currants has been much neglected for quite a number of years through this district, as a result of which this fruit is now much in demand, and not enough of it is produced to nearly supply local demand.

About a dozen varieties are being tested by me, most of which have borne more or less for several years. Some of the newer ones have only shown what they can do the one season. Prominent among these is the Perfection, which produced the heaviest crop of fine large red currants that I have ever seen on young bushes. If it will continue to thrive and bear like it did this season, it will eclipse all other sorts on this soil.

Chatauqua, Wilder, Fays, and Cherry all produced excellent crops of fine large fruit. LaVersailles produces a good crop of fine fruit, but the bush breaks down so badly that I would not care to grow it for market. Prince Albert gave a good yield on young bushes, but the fruit is not so large as most of the sorts named, it was latest of any this season, and should be valuable where a late sort is wanted.

Judging from experiment with red currants for the few seasons I have grown them, I consider that a plantation of the better varieties of red currants should be very profitable here, and in order to test and demonstrate it more fully, I intend planting out several hundred bushes to be tested in a commercial way, as this crop has been entirely abandoned by practically all growers in this vicinity.

White Grape gave a very heavy crop again this season of medium-sized fruit of excellent quality.

Of the black currants, Naples produced the heaviest yield this season. Victoria produced a fair crop of large fruit. Champion was rather small this season, and latest of all to ripen.

Gooseberries.

Several varieties of English gooseberries are being tested here, but the plants were in very bad shape when received from the nursery in 1907, and many of them failed to grow. Those that grew have borne well in the past two seasons. The variety called Keepsake has outgrown all others, and bears a heavy crop each year of very large, fine fruit. This variety was by far the largest crop as well as the largest fruit of any. Whitesmith came next, followed by Industry. The bushes are sprayed every spring with the lime sulphur wash, and as yet have not suffered from mildew.

Very few gooseberries have been planted for several years in this county. There is quite a demand for the fruit in all markets now, and I think of planting several hundred bushes in order to test them in a commercial way, as it would appear from results with the few bushes in experiment that it would pay to grow this fruit in a commercial way.

Vegetables.

About the usual quantity of early vegetables were started again in 1910 at this Station, but the season was rather a precarious one, and while the total results were fairly satisfactory, they were hardly up to the average of previous years, which is accounted for by the fact that the hailstorm of August 10th was very severe in this immediate vicinity.

No lettuce was grown last winter at this station, as our main greenhouse was entirely planted to carnations, which were not removed until the end of March, when the house was planted to cucumbers.

As many who are growing vegetables under glass think they would like to grow carnations, I think best to sound a note of warning, as, judging from one season's experience, I would say: "Stick to the vegetables, unless you are going into a general florist business." While I had an excellent crop of carnations, even better than I had hoped to grow, I found that they required much time and care during August and September when we were very busy harvesting peaches.

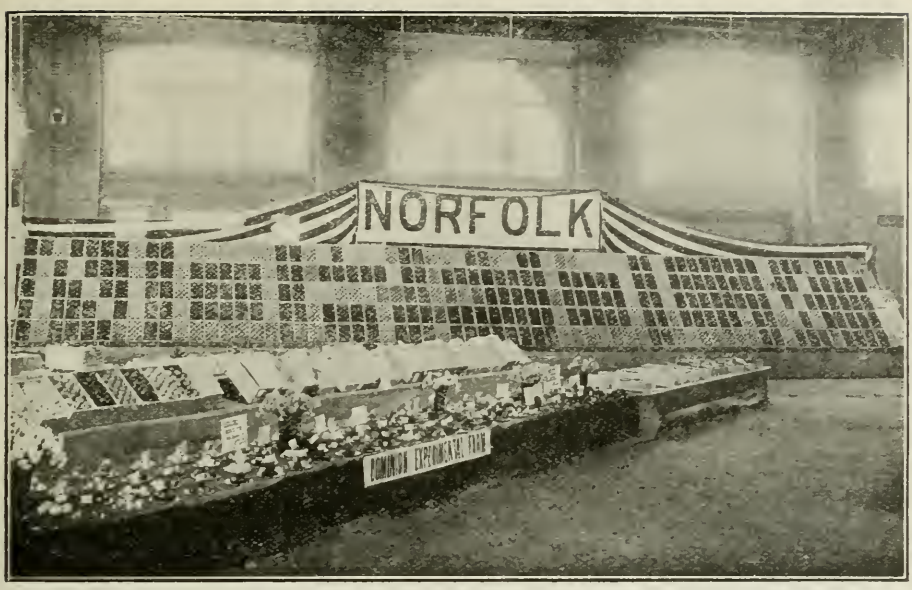
Another difficulty was that while a fruit and vegetable grower may have an excellent market established for these crops, he is compelled to seek other markets for the flowers, and I found that one growing only carnations has not the same chance to secure good prices as has the florist who has a full line of other flowers, and has more or less of an established market for such crops.

As it was found that carnation growing did not fit in well with our other crops, we decided to abandon it, and are growing lettuce again this winter.

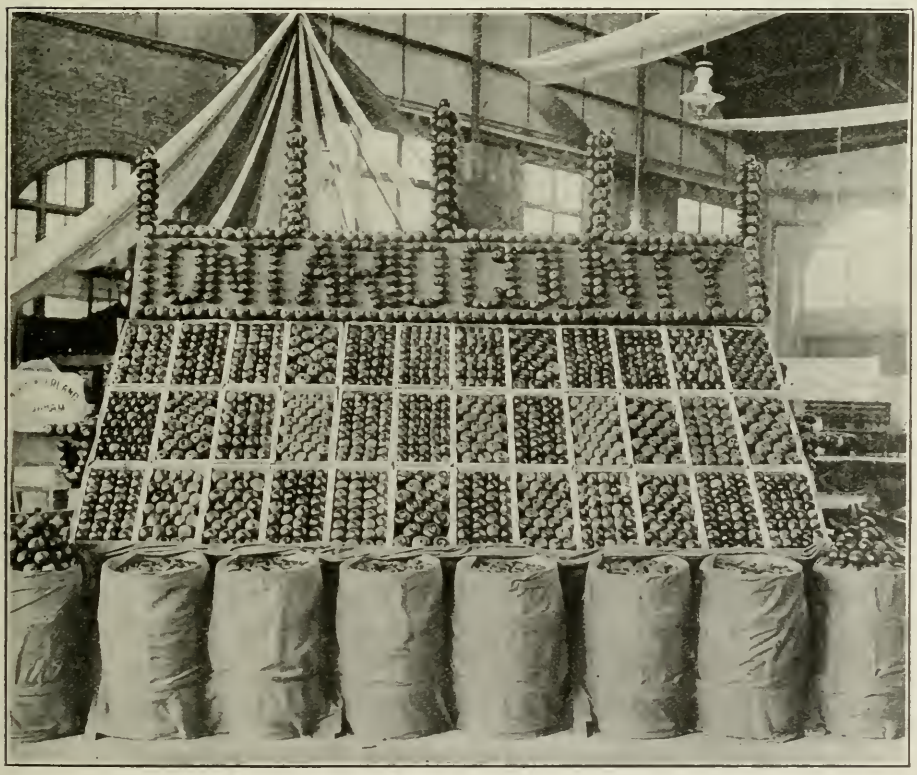
Cucumbers.

As usual, all our space under glass, about 11,000 feet, was planted to cucumbers just as soon as it could be cleared of tomatoe, melon and pepper plants, which were grown for early fruiting in the field.

The cucumbers grown under glass are mostly set one plant in a place, about thirty inches apart in the row and trained upon a wire trellis, side branches are pinched off beyond the third leaf, except in some cases, where there is room, one branch is allowed to grow.



An attractive exhibit of boxed apples at the Ontario Horticultural Exhibition. 1910.



Well packed boxes from Ontario County, Ontario Horticultural Exhibition, 1910.

We seldom fail to secure a good crop, but to do so it is important to make the soil rich and to supply a liberal quantity of water after they begin setting fruit. We had a good crop again this season, for which we found a ready market.

As the last half of the month of May and first half of June were so cold and bad for the production of cucumber plants, and those planted in the open early in the season throughout Western Ontario were mostly lost, I made a second planting much later, and grew about one-half acre outside in a warm location. These were kept well watered during fruiting time and produced a good crop.

In order to produce a good crop of cucumbers outside, early enough to sell by the basket, it is important to have an early location well protected from the wind. I realized this a number of years ago, and erected a tight board fence eight feet high to the north and west, as there is a chestnut grove on the east, and the land has a little slope to the south. I have about an acre in this location that is well suited for producing early crops of this sort.

Water is supplied from a 180-barrel tank, which is fed from a well, pumped by windmill when there is sufficient wind at other times by a gasoline engine.

Cabbage.

We grew somewhat over three acres of early cabbage the past season. The seeds were sown in flats in the greenhouse the latter half of February, were twice transplanted while under glass, and planted in the field April 11th to 13th, as the land was in good condition, and as good cultivation given (cultivated and hoed about twice a week) an excellent crop was secured.

The varieties used were Jersey, Wakefield (Burpee's Market Gardeners' strain) and Paris Market. We have been growing these two varieties for several seasons, but are inclined to favor the former. While the heads are smaller, and hardly so early, it is a much firmer head, and the plant is more hardy. While we were able to produce a good crop very early in the season, the crop did not sell well. As the weather was rather cool in June, both here and in the south, it favored the importing of cabbages so much that all the larger markets were filled to such an extent that prices ran very low, much of it hardly realizing anything to the grower; consequently our extra early crop did not sell as well as did that coming in two or more weeks later when the market got cleared up.

Tomatoes.

About six acres of early tomatoes were grown the past season with satisfactory results. We find it important to have good plants grown from a good strain of seed, as it frequently happens that the difference in returns from these causes amounts to upwards of $100 per acre. I have been selecting a strain of Earliana for a number of years, going over the field early in the season each year and selecting only from plants that show a good type of both foliage and fruit by selecting the best fruits from the best plants every year. I now have secured a good, even form of plant and fruit, and a little earlier than any other that I have tested.

A selection of the same variety from W. T. Macoun, C.E.F., Ottawa, appears equal to it, except for earliness. Excellent results were also obtained from seed secured from W. A. Burpee, called Sunnybrook Strain.

To secure good plants we sow the seed in flats in the greenhouse about March 1st, transplant three or four times, the last planting usually being made in cool frames, where they are given a space of six by six inches. Here they are given plenty of air for a week or so before removing to the field.

As soon as they are planted out they are treated to about one teaspoonful of nitrate of soda to each plant, cultivated and hoed every few days, and thereby stimulated to grow as rapidly as possible.

Musk Melons.

The melon crop met disaster at both ends of the season in 1910.. As usual, we started a lot of seeds in the greenhouse during the later part of April, which grew splendidly until after the second transplanting, and until they were nearly ready for the field. Then we got a spell of very cold, wet weather, which destroyed nearly one-half our plants, and most of these were right under glass at the time. I had never seen plants perish as those did, but all growers shared the same fate, some losing much the greater number of their plants.

As many of the early plants were lost, later sowings had to be put in; but as the season was getting advanced by this time, those plants did not get sufficiently large to remove to the field until the end of June, and as a drouth set in at this time, they did not do as well as usual. All growers agreed that it was most difficult to get a stand of hothouse-grown melon plants this season.

On the other hand, seeds planted directly in the field late in May grew splendidly. In fact I never saw such thick, heavy growth of melon plants as we secured this season from seeds planted in the field, and they set a heavy crop of fruit which grew to a good size in spite of a severe drouth all through July. We had begun to harvest a few melons from the earliest portion of the field in early August, when, on the 10th of that month a hailstorm descended with such severity that when it was over one could not find so much as one half of a melon leaf in the seven acres, which had looked so promising just before the storm.

The melons that were full grown and were about ready to ripen, continued to develop and ripened up rather rapidly, but the quality was not as good as it should have been. The later portions of the field were of no use, and the disc harrow was put on to fit the land for a fall cover crop. This hailstorm was severe only over a comparatively small territory. Where the storm was most severe great damage was done to the tobacco as well as other crops.

Our soil and climate is such that in ordinary seasons the musk melon crop is usually a satisfactory one to grow, and usually sells at satisfactory prices for good stock. It becomes more evident each season that the melons of best quality are what the market wants, and we as well as other growers are now growing many more of the better types than we did a few years ago. Such varieties as Osage, Hoodoo, Rocky Ford, Fordhook, etc., are being largely grown now, and are proving the most satisfactory to producer and consumer.

Asparagus.

Of the three acres of asparagus, all but one-half acre was in bearing this season. The plants produced a heavy crop of seed in the fall of 1909. The following spring did not seem favorable to its growth, and only a moderate crop was harvested. As the crop was generally light all over the country, the price was good, but hardly sufficient to make the crop as profitable as I had expected. However, the plantation is too young yet to produce a full crop, and as the plants were in much better condition at the end of the past growing season we look for a better crop next year.

Peppers.

About half an acre of large sweet peppers are grown each season, and usually pay fairly well. This season they were just beginning to pick well when the hail storm caught them. This completely destroyed all fruit that had attained much size, and also battered the plants to quite an extent.

As the storm thoroughly soaked the land, which was previously very dry, a good cultivation was given as soon as the land was in condition, and the plants branched out and put on a very heavy crop of fruit, and as we had no killing frost until October 29th, a goodly portion of it was marketed.

To secure best results with peppers it is necessary to start the seeds quite early in March, giving plenty of heat to start the seeds well. We usually transplant twice while under the glass, and remove to a warm location in the field as soon as danger of frost is over. If given a rich soil and good culture they seldom fail to produce a good crop.

VEGETABLES.

E. E. Adams, Leamington.

I have to report that seed selection has been made again in tomatoes, peppers, canteloupes and potatoes with some progress. Starting at this work in 1909, and making selections from the products of that year, and re-selecting again this season will, I think, give us a fair start for assisting in producing more uniformly better stock than the common quality. In potatoes I find some improvement in form already, and have hopes of considerable improvement in the future. In canteloupes, I find even after one selection that there is a decided improvement in the netting which goes to make for quality and flavor, as I find melons that are well netted are usually the finest in quality. The selection for seeds as made this year should show a decided advance for another season as the fruits were taken from individual plants of advanced type, that is, from small plants of good vigor, and were very heavy, thick-fleshed and well netted and of good quality and flavor.

Peppers as yet do not show any improvement, although individual plants are taken as types and seed from these plants carefully selected and grown for plants in the spring; all weak plants are thrown out, leaving only the stronger to go to the field. What is wanted is smoother and better shaped peppers and, if possible, more productive types.

Tomatoes are improving somewhat in shape and in productiveness. Earliana has been selected on my farm for some time, and we now have a type that is a very great advance on the earlier production. The present type is a very good sized tomato, smooth, and rough fruit almost none. This tomato has proven the best money maker on the soils in South Essex of any that are now on the market. We even find it very good for green house use, producing very good fruits and in abundance.

Other tomatoes under selection are Chalk's Jewel, Stone, Earliest of All, and Wealthy. The Wealthy has been selected for three years, and we now have a nice, smooth tomato, much superior to the first planting, with very few rough.

Considering that this work has only been commenced and that in some items an advance has been made, and with care in selection I hope to report next season a considerable improvement in all the stocks under test.

ST. LAWRENCE EXPERIMENT STATION.

HAROLD JONES, MAITLAND.

The season of 1910 has been very even in temperature and favorable for fruit trees along the valley of the St. Lawrence.

The winter passed without high winds, with a fair covering of snow; the thermometer falling to 20 below on two days, Feb. 7, 11, which only lasted a few hours in each case.

Spring opened on March 28th with ploughing commenced.

Exhibit of apples from Demonstration Orchards in charge of Fruit Branch, Ontario Horticultural Exhibition, 1910.

April followed dry and cool, which was favorable for grain seeding and cultivation of the soil, but held fruit buds dormant and protected to large extent from frost injury.

Fruit buds swelled and burst on April 22nd, when cool weather held them just at this stage until May 19th, when apple trees were in full bloom, with lowest temperature recorded during bloom of 42 degrees. Blossoms fertilized well and gave a full setting of fruit. The June drop was severe in some cases, but resulted in a crop of better quality, and relieved one of the necessity of thinning.

The fruit matured rapidly and was ready for harvesting a week earlier than normal. The trees have gone into the winter in good condition, with well ripened wood and healthy appearance.

INSECTS AND FUNGI.

Insects were fairly numerous. On April 22nd the leaf buds were swelling and a few burst open. At this date I sprayed with lime sulphur (concentrate

lime sulphur) reduced 10-1 for oyster-bark louse and green aphis, which gave good results, removing or destroying a very large percentage of bark louse, and entirely cleaning the buds of aphis.

Blister-mite is giving no trouble as yet on apple trees in this section.

May 26-28—Sprayed lime sulphur, 30-1, just after blossoms fell.

June 27-29—Sprayed lime sulphur, 30-1, for spot fungi.

Examination by actual count on July 29—Sprayed Fameuse, 80 per cent. clean. 4 per cent. Codlin Moth. 8 per cent. Spot.

Unsprayed Fameuse—20 per cent. clean, 8 per cent. Spot and Codlin Moth. 72 per cent. Spot.

Sprayed fruit grew to normal and large size with high color. Unsprayed were undersized, poor color, and there was a heavy drop before harvest.

Cultivation and Fertilizers.

A great many reports have appeared in the press during the past season about climatic conditions, insect pests, debility of trees, etc., causing the serious shrinkage in the fruit crop this year. This is no new thing, but is only becoming more noticeable with the extension of our markets and increased demand at home.

For years I have been considering this matter and watching results under varied conditions, such as I am able to obtain here at home and elsewhere.

Do we realize that we are starving our orchards? What farmer among us would think of growing wheat in a field for twenty years in succession without manure? What would be said of one who attempted, not only that, but also at the same time tried to secure a catch crop from the same land.

Yet hundreds of farmers are every year attempting just such a short-sighted policy. They try to grow apples and grain or hay on the same land.

It has been estimated by eminent chemists that the plant food carried away from an acre of bearing apple orchard in fruit sold, and leaves blown away would be worth at commercial rates $207.45 in twenty years, or over $10 worth a year.

Against this a fifteen bushel crop of wheat would remove in twenty years only $128.23 worth of plant food, or between $6 and $7 worth per year.

A bearing orchard makes annual demands upon the soil almost as heavy as a 25-bushel crop of wheat, not allowing anything for the yearly growth of wood.

Remember, too, that an orchard makes no return of roots and stubble to keep up the physical condition of the soil; nothing but a few leaves and the seeds of some waste apples.

Yet, when an orchard has borne a crop of fruit, and perhaps had a crop of hay or grain removed the same season, we wonder why it should need a rest for a year or more.

Bear in mind that a cropped orchard not only suffers a double demand on its fertility, but the sown crop is almost certain to deprive the trees of moisture, particularly in the early part of the season, when an extra supply of it is most needed.

A good orchard, well attended, is the most profitable branch of the average farm. It should be liberally fertilized and cultivated (if possible) in the early part of the season. It pays handsomely to do it. Do not starve the goose that lays the golden egg. From a careful record of sales made from the product of four acres of Fameuse planted in 1881 dated from 1894 to 1903, a period of nine years, I received an average net return of $800 per annum, after paying all expenses of picking, packing and commission of sales, except cost of barrels.

Since 1903, when the severe freezing of that winter killed 68 trees and severely injured many others, my gross returns per year have been: 1904, $298.45;

1905, $651.86; 1906, $208.70; 1907, $949.45; 1908, $964.22; 1909, $580.40; 1910, $1,048.95 (not completed); or an average gross return of $671 for the seven years. These returns have been obtained by fertilizing regularly with cultivation and cover crops.

I have some trees that have been under clean cultivation since 1896 *without manure,* and although they made good growth in wood until bearing age, they now show a tendency to short and feeble growth in the terminal wood with fruit undersized, poor color, and lack of maturity, but a good setting of fruit.

In the same soil in sod pasture, I find poor terminal growth, less than one-fourth crop, undersized but good color. The same soil in sod, trees mulched with sawdust, barnyard manure and waste corn stalks, I find a medium crop of high color, that grades well, but too many undersized.

The same soil cultivated from early spring to June 15th or 20th, with an annual application of barnyard manure during the winter with wood ashes or muriate of potash, and growing a cover crop of clover, or even weeds, gives a full crop of fine fruit that grades 80 per cent. to 90 per cent. clean, with high color, and good to large size.

My results show that for the St. Lawrence valley the most profitable procedure to follow is to use barnyard manure at the rate of one load to 12 or 15 trees annually, spread on the snow in winter with shallow plowing and cultivation in the spring, until the 1st or 15th June, allowing the growing after this date of cover crops.

The next best results are by clean cultivation to the early part of June. Then a heavy seeding of clover with muriate of potash.

Apples.

The crop of apples in the experimental orchard was uneven. The appearance of the orchard is patchy, owing to many varieties being planted that were not suited to this climate, and are now dead or dying. However, a number are making fair progress and showing good points. Alexander maintains its reputation for vigor and hardiness, but too large a percentage of the fruit rots on the tree, making it hard to handle and cutting down the yield. Arabka, a hardy, vigorous grower, coming into bearing early, not of as good quality as the Duchess, season the same.

Baxter is fairly well loaded every year, but never a heavy crop, a handsome fruit that sells well at top prices, subject to sun-scald and canker, which weakens the trees.

Blue Pearmain, a very hardy, vigorous tree, slow to come into bearing, but gives good crops of high class fruit that commands good prices in January and February, keeps in ordinary cellars into March; a desirable winter apple.

Gano gave a fair crop of high colored fruit trees showing sun-scald and canker; probably short lived like Ben Davis in this section.

Gravenstein, top grafted, 1902. The first crop harvested this year; five apples, well grown and colored.

King. Top graft, 1905; crop twelve apples, well grown and colored.

Longfield is not desirable for the St. Lawrence Valley. The trees are very hardy, but a slow grower on account of its heavy fruiting quality. The fruit is small, more like a crab apple—too small for peeling and of poor quality. Unless heavily thinned it is not worth growing. Practically unsalable in the open market. This variety has been boomed by tree agents and sold in fairly large lots, representing the variety as a late winter of first-class quality. Work like this does more to discourage the fruit industry than any other thing. The stock can be suc-

cessfully grafted to desirable varieties suitable to the district, which would largely overcome the harm already done.

Mann is another variety boomed by agents and has led to much disappointment. The tree sun-scalds and blights, and dies at an early age.

Milwaukee continues to maintain its reputation as a business tree. It comes into bearing early, and the fruit commands fair to good prices and is in demand as a cooker all through January and February. The tree is a rather slow grower and will top graft successfully on Longfield without outgrowing the stock.

Milding has now given several crops of large attractive fruit that keeps well into February; a promising variety that is well worth further trial. Tree vigorous and hardy, coming into bearing at about ten years of age. Fruit oblate, 3½ inches across the core; skin bright yellow splashed and streaked with bright red; flesh light yellow, tender, breaking, juicy, flavor, brisk subacid, good.

Parlin Beauty, another apple of bright promise, tree vigorous, healthy, hardy, and promises to be a good bearer. Fruit large, 3 in. to 3½ in., oblate, skin bright yellow, almost entirely covered with bright crimson dots partly obscure, numerous; flesh white, juicy, mild, subacid, with an aroma; core very small. A very attractive apple and well worth an extended trial.

Wolf River is a hardy, vigorous tree of spreading habit, giving a fair crop of large to very large handsome apples; keeps longer than Alexander, and does not rot on the tree to any extent. It sells well on the market; a good show apple for decorating shop windows.

With our standard varieties of world-wide reputation, such as Fameuse, McIntosh, Scarlet Pippin, the intending planter will do well to carefully consider the merits of any other varieties before planting. Our study for a long time has been to grow a late winter apple with profit. We certainly can grow a long-keeper, such as Canada Red, Golden Russett, or Bellflower; but the light crops and some years only partly matured fruit places these varieties in the black list as unprofitable.

If in conducting variety tests in the station work we can find a hardy tree for our climate bearing paying crops of late winter fruit that will keep into April, with good size, color and quality, we would then have something that would rank with our Fameuse and McIntosh as money-makers.

Cherries.

There was a medium to full crop of cherries. Montmorency produced a full crop of well-matured fruit. This is the best of all the varieties, and has given an annual crop for years past. English Morello comes second in yield, fruit of good size; tree and bud are proving quite hardy, and can be counted on to give an annual crop.

Early Richmond has not done so well with me as the two above, and the fruit is more apt to be attacked by birds.

Orel. The fruit is too small and too sour when compared with Montmorency. The trees also are showing weakness, and are dying off slowly.

Ostheim has never been a success with me. The bloom has been injured several times when Morello and Montmorency have escaped. A very shy bearer, and fruit small. I cannot recommend planting this variety.

Olivet is tender in wood and bud, and is not suitable for this climate.

Pears.

Flemish Beauty and Ritson produced fair crops of fruit.

Flemish Beauty in cultivated orchard are all dead. One tree planted in sod appears quite healthy and bears every year.

Ritson are breaking to pieces, and are almost dead; apparently not as hardy as Flemish.

The Russian varieties that are living are worthless. They bear some fruit, but it decays on tree before reaching maturity.

Plums.

Glass Seedling, thirteen years old, produced the first crop of plums in their history. The blossom bud came through the favorable winter without injury, and on three trees I secured five gallons of well-grown fruit.

Dunlop Seedling No. 53 (two trees), also gave a nice crop of six gallons. These trees are just coming to bearing age, and may prove of great value to the St. Lawrence Valley.

The Americana plums set two years next spring had a few blossoms this year, but did not set fruit to any extent.

Hammer, a variety that has borne annually for ten years or more, broke down and died this summer.

Cluny gave a scattered crop.

From present appearances the collection of Americanas planted in the springs of 1908 and 1909 will produce a group of value to this section; several of them show splendid vigor and hardiness.

Strawberries.

Plots came through in excellent condition, and the crop was all that could be desired in everything except length of season. Prices were good right through the season.

Wm. Belt and Williams were the leaders. Wm. Belt, with its fan-shaped berries and excellent quality, commands a top price. Williams for the local market can be easly harvested fully ripe and free from the green tip that is characteristic of the variety. Three W's is another successful variety, and should be given a place in every bed.

Woolverton is a handsome berry and good cropper, but its mild, almost milk-like flavor, is not popular, and is better left out of the varieties for market.

Mrs. Miller has done wonderfully well with me, giving better crops, of large, bright red berries, flattened at the tip like Three W's, than many of the so-called best.

Climax is another good berry. Plant healthy and vigorous, did very well.

Sample and Splendid have not been quite up to the mark, but have given fair crops.

Tennessee Prolific has always done well with me, and is a desirable variety to plant.

Warfield is often a disappointment. It did well this year, but a drouth at picking time will ruin the crop.

For a profitable plantation the following grouping will insure a crop almost any year: Tennessee Prolific, Miller, Three W's, Williams, Wm. Belt, Saunders.

The early varieties hardly ever produce a profitable crop for the land occupied, with the possible exception of Haverland. Tennessee Prolific and Wm. Belt are only a day or two behind, and carry their pickings well through the season.

Raspberries.

Herbert is proving perfectly hardy, and producing crops of well-grown, large-sized fruit. It is a vigorous grower, with large, healthy foliage, and produces well; a very desirable variety for this section, where we have been hunting for many years for a hardy cane.

All the varieties before tested have been tender and killed back more or less every winter, sometimes so badly as to destroy the whole crop.

Cuthbert in the past has been the most generally planted, but the uncertainty of its coming through the winter without injury has discouraged the planting. Herbert now overcomes this difficulty.

Older is the hardiest of the blackcaps, a handsome fruit and fairly prolific, but of a very sprawling habit. It makes quantities of tips and needs constant care to keep the row in line. Blackcaps have never been satisfactory, and practically none are grown here.

Currants.

Red Currants produced excellent crops of well grown fruit. Cherry holds its own against all comers, giving long bunches, well filled with large to very large berries. Bush moderately strong, but some trouble with breaking down under heavy snow.

Raby Castle is also a profitable currant, with long bunch well filled to the tip with medium to small berries. Bush strong and vigorous.

Fays is weaker in bush than Cherry and has not the vigor. Bunch short, sometimes only four or five fruits on it. Fruit large to very large, but has not been profitable.

Wilder and Prince Albert are too late in season to be desirable; foliage is too heavy and is very subject to aphis. The earlier ripening varieties hang to the bush well and give fruit of better quality all through the season.

White Grape is very prolific, but the fruit is not in demand on the market and has never been profitable.

Black Currants produced splendid crops this year. Victoria, Lee's Prolific and Champion have proved the best varieties so far.

Champion, a moderate grower, fruit large to very large, subacid, moderate yielder.

Lee's, fairly vigorous, fruit large, mild, subacid, a better yielder than Champion.

Victoria, strong grower, very vigorous, fruit large, brisk subacid and yields the largest crops of any variety on test and holds well to the bush.

Gooseberries.

Gooseberries gave a good crop of full-grown fruit. Golden Prolific is all around the best variety ever grown here; fruit large to very large; free from mildew, a strong grower and productive.

Champion, a strong, vigorous grower, very productive fruit about the same size as Downing, but easier harvested.

Downing, the old standby, produces well every year, apt to overbear and produce undersized fruit.

ALGOMA FRUIT EXPERIMENT STATION.

CHARLES YOUNG, RICHARD'S LANDING.

The winter of 1909-10 on the whole was favorable, being comparatively mild for this northern climate, March being particularly so. This month and April are the months during which we sustain the greatest damage to our young orchards by sun-scald. Bright, sunny days, followed by hard frost at night, are very trying on the vitality of young trees. The losses from sun-scald last spring were very light. May was a cold, disagreeable month, and vegetation made little progress until towards the end of the month. The bloom on most varieties was very fine, and the fruit set fairly well. June came in with dry weather, which continued all through the growing season. Perhaps this was the reason for the excessive drop which continued all through the summer, or it might be from the imperfect fertilization of the blossom. On the whole, however, early apples, with

A profitable strawberry patch.

the exception of Transparent, were a very fair crop, much better than might be expected, considering the heavy crop of the previous year. Winter fruit was not up to the average, and was what might be called very patchy, there being no uniformity about the crop—in some orchards a full crop, and in others almost nothing. The past season has caused me to somewhat modify my opinion of sod versus clean cultivation. Certainly those that were kept clean by surface cultivation had the best crop, the largest fruit, and the fewest culls. Field mice did little or no damage this year; it is only very occasionally that they are to be reckoned with as an orchard pest. Scab, notwithstanding the dry season, was more in evidence than I have ever seen it before; and I notice that where it was first seen a few years ago, it has been gradually getting worse, although some orchards are yet perfectly clear. In my own orchard, in the portion set apart principally for experimental purposes, scab has made little or no appearance yet, although most of the

trees are into bearing; while in the old orchard, planted twenty-eight years ago, it would be impossible to grow clean fruit without spraying, which has not been done on the never planted ground except for aphis. They are only about 100 yards apart, but the newer ground receives clean cultivation, while the old part is only plowed up and cultivated once in five years. Oyster-shell bark lice are still getting worse, and if not taken in hand will soon ruin many of the small orchards; but I am pleased to notice that a vigorous war has been started this year against this pest, with results depending entirely on the method and persistence of the remedy. Bark lice and sun-scald are our chief trouble in growing fruit in the north, but both are under our control if proper means are used. Just here on St. Joseph Island, where fruit growing is more of a specialty than in any other part of District No. 13, there is still much to be done, the difficulty being that there are only a few who go into fruit growing as a specialty; the others as a sort of a side line, and grow enough for themselves and a few barrels to sell. I am, however, pleased to notice that for the last few years much more attention and care, with corresponding results, have been evident in this part of Algoma. I know very little about the extreme ends. Looking at the map, and beginning at the county of Pontiac, in the Province of Quebec, in the east, going west and north to an undefined distance, there is evidently plenty of room for experimental purposes. Adaptability will take time to find out, but judging from enquiries I have received there is a growing interest at both ends, especially from the Rainy River and the Temiskaming Districts. The latter I know little about, but I can see no reason why the Rainy River country should not produce enough fruit for itself, and small bush fruit to export further west. It is true a start was made some years ago at Dryden and failed, but a most unsuitable piece of ground was chosen to begin with, and besides when any undertaking is begun with the expectation that it will turn out a failure it is quite likely to do so. Most enquirers state that they fear the extremely low temperature. "It sometimes gets 40 below zero," they say. Well, it has done that here on several occasions without any bad result so far as the apple crop is concerned, provided the wood has matured the previous fall, with plenty of snow on the ground, and an absence of wind. I recollect one winter several years ago when 42 below zero was reported, and for several days 30 degrees below, but there was a fine crop of apples the following season. But I notice what may not be so apparent in more favorable climates that there is a great difference in the individuality of the same varieties, as well as in the quality of the fruit. This has been especially noticeable to me in the Fameuse group, and I strongly advise all who want to ensure the best success to top graft with scions of proved hardiness and quality. Nor is this all that is necessary; the stock should be also hardy. This may be done by raising seedlings from the very hardiest apples, preferably from a hybrid crab. Cultivate them well the first season, and then select the strongest for root grafting. Head the trees low, say not more than two feet for upright growing varieties. I cannot say that I have always succeeded in top grafting on an old crab stock; only sometimes a perfect union is made, but the scion outgrows the stock. Never use the water sprouts for scions, as the wood is usually not fully matured, and an inclination to sprout will be evinced by the top if it does grow.

Now to sum up. Much depends upon the man. The fruit grower in the north: What is he? and What should he be? The fruit grower of the present is often a failure. Why? He knows little about his business. He intends to learn when going through his successful neighbor's orchard, but he has other things to attend to, and so puts it off until his trees are dead or may just as well be so.

Then he consoles himself by saying that he planted them well. (So he did), but he found out that his ground was not suitable, or that the nurseryman cheated him. Nothing of the sort. It was the man himself, and not the ground or the trees. The successful grower must first have a liking for his work, he must keep his eyes open to what his neighbor is doing successfully in order to succeed himself, he must understand something about the laws of nature, he will study the sciences that underlie his business, he will study his soil, he will have a knowledge of insects and fungus growths, he will know what varieties are suited to his soil, climate and market; he will be honest in his dealings. I know of such men, and they are successful. In regard to our market, this and adjoining portions of the mainland are exporting to nearby local markets many times the quantity of fruit they did a few years ago. We are always expecting to glut the market, beginning with strawberries and ending with fall apples, but somehow the appetite is keeping up with the production. For late winter apples we have nothing to compare with the Ontario-grown Spy. I am hoping that some just coming into bearing may partly at least fill the bill. Consumers are always willing to pay fifty cents a barrel more for local-grown fruit. They say the quality is better, and they ought to know.

There is a bright outlook for fruit growing through this section, and more are making a specialty of this branch of agriculture.

Apples. The apple crop this year was fairly good, except winter fruit, which was light. Charlamoff, one of the hardiest apples grown, has taken an off year. This apple has a short keeping season, but the market wants more of them.

Transparent: Not quite a full crop, and small.

Wealthy: Our old standby, good as usual, but dropped badly from the trees this year.

St. Lawrence: Good; does not bear quite enough fruit to be profitable as some others. St. Lawrence can scarcely be called a winter apple.

Peach: Profitable to grow here; hardy; quality good in its season.

Longfield: This apple has been too extensively advertised. It is hardy, fruits quite young; of fair quality; rusts badly after being sprayed with Bordeaux; fruit too small to suit the market; inclined to overbear; needs thinning.

Alexander and Wolf River may both be classed together. Inclined to overbear, then takes a few years to rest.

Duchess: Always good, the most profitable apple grown.

North Star: Follows the Duchess, and nearly as good.

Astrachan: Good, enquired after.

Liveland: Early September, hardy, good, productive.

Low: Early, productive, resembles the Duchess, bears every year, fruit rots badly, hardy.

Gipsy Girl: Quality medium, fruit large, hardy.

Red Annis: Quality medium, productive, hardy.

Brockville Beauty: Quality good, productive, hardy.

Gideon: Quality medium, productive, hardy.

Peter: Quality good, productive; resembles the Wealthy, but larger, and better color, keeps longer; very desirable.

McMahon: Quality medium, productive, hardy.

Shiawassee: Good, very productive, hardy, desirable.

Snow: Very good, medium, hardy, productive.

Louise: Good, medium hardy.

La Victoire: Good, hardy, productive.

McIntosh: Very desirable every way; is being extensively planted; fruit clean where grown here so far. This apple is more sought after than any other. Cannot begin to meet the demand.

Milwaukee: Not fully tested yet; cooking good, dessert poor, very hardy, winter.

Hibernal: Very hardy, only fit for cooking.

Winter Arabka: Quality poor, cooking fair, large, hardy.

Scott Winter: Quality fair, not productive enough, medium hardy, fruit too small, winter.

Baxter: Quality good, medium hardy, not fully tested.

Gano: Quality poor, no use here.

Black Ben: Quality poor, productive, hardy, keeps to spring.

Tolman: Quality good for those who want a sweet apple; this apple has been recommended as a stock for top grafting, but it is too tender here; not desirable for the far north.

These are some I can speak of with any certainty about. There are perhaps twenty others that have been recommended to me, which I am growing as top grafts, some of which fruited this year; but I prefer to say nothing about them yet. In past years we have depended on Wallbridge, Pewaukee, and Scott's Winter for late keeping, but none of these are satisfactory. Others not fully tried will, I think, turn out more satisfactory. Winter apples have never paid us anything like summer and fall fruit, and winter apples will have to be brought from the East for some time yet. I have tried to grow Spy, but with very poor success, and am pretty safe in saying that a Spy apple was never grown in Algoma. I have fruited Ontario, but the tree is too tender here. However, I am trying them again.

Pears. Pears have never been a success here. A few under exceptional conditions have done fairly well, but it is useless to grow them commercially. Top and trunk are both too tender down to the snow line. I had some promising trees up to the winter of 1893 and 1894, but that was too much for them. Nearly all started above the ground again, and this year had a little fruit of poor appearance. The Russians are quite hardy this year. Berrimankie had a very fine crop of large fruit and of a better quality than in previous years, but the keeping quality was no better; it begins to rot at the core before it is quite ripe; it is of no use for the market. I have several others supposed to be Russian not fruited yet, which are said to be of a better quality. Flemish Beauty and Idaho seem to be more hardy than the others I have; had the best success on rather heavy clay loam. I am trying to grow them more in bush form, with the top springing directly from the surface of the ground. A profitable market for Ontario-grown pears can be had here. It is mostly California fruit that is sold, of good appearance but inferior quality.

Cherries. Were a fair crop; not quite as good as in former years, which may be accounted for by a three-days' rain while in bloom. While the demand is limited, there has never been enough grown to meet that demand. Sweet cherries are a complete failure, and there is no use trying to grow them. Even the Dukes are too tender, and only the Morello should be grown, and then not far away from the influence of a large body of water. Further back only the old Canadian can be depended on, which in appearance and quality is but a little behind the Richmond. The trees are short lived, but have a habit of reproducing by suckers from the root. The best way to grow them is to let them have a place entirely to themselves, and thin out occasionally when they get too thick.

Burbank Plums.

Sweet Cherries in bloom, St. Catharines.

Plums. This fruit with me has been both a success and a failure. Japan plums made a splendid growth until into bearing, when they began to die one after another, perhaps owing to the season to some extent. They were all on the peach root, which is I think a mistake when planted here. Another lot on the wild plum stock, Glass Seedling and Lombard, have all done well, and fruited for several years. Glass, although not what might be called a heavy bearer, has been very satisfactory. Pond's Seedling fruited this year. We have also a large and perfectly hardy Lombard inclined to overbear, needs thinning. Native Yellow of good quality, hardy, prolific and evidently of European origin, but which evidently escaped from cultivation and became acclimatized. An excellent plum, perhaps a little sweet for cooking, but good to eat out of hand. This plum is being propagated. I would like to know just what it is. Americanas are hardy enough, but they have several faults. The top is very brittle, and you are apt to lose half the top when loaded with fruit. The skin is thick and tough. Most of them are too late in ripening, and the color is against them in the market. So far I would prefer Glass to any of them. Those I planted were on the plum stock. Plums have been so near a success that during the last three or four years I have been getting from different sources a large variety. These have nearly all come to me without any name; some came by number. Several have fruited, and so far promise better than anything I have had. They are all vigorous and healthy, with dark green foliage, large size; quality not quite as good as the best European, about equal to the Japans. It will be interesting to watch them as they come into bearing. Last spring I received from the Central Experimental Farm, Ottawa, the following: 1 Mankato, 2 Brackett, 1 Consul, 1 Fitzroy, 1 Tenny, 1 Omaha, 1 Gloria, 1 Oyama, 1 Don, 1 Swift, 1 Bixby. All are living, but made little growth, owing perhaps to the very dry summer.

Grapes. As my object principally was to find what varieties were hardy and suited to the soil and climate, perhaps I have not paid sufficient attention to this fruit. Last fall I pruned, laid down and carefully covered up the vines. Result, a fine crop of fruit, large in the bunch and individual berry, and of a much better quality than formerly. Delaware and Campbell's Early were especially fine. Other varieties colored up nicely, but were inferior to eat. With a little care and winter protection in a favorable season I would not be afraid to compete with Southern-grown grapes at the price they are on the market here. Green Mountain was especially good. Concord ripened, but was not quite up in quality, although better than usually put on the market here. There is too much immature fruit sent West, which naturally lessens the demand.

Raspberries. Cuthbert was a failure again this year. I have never had but one good crop. I notice they do best with a full northern exposure. Perhaps that helps to ripen the wood better in the fall. Brinkles Orange, which I have always recommended as the best berry for home use, but too soft to ship, I discarded last spring. A few canes were overlooked, which bore such a fine crop that I intend to try them again. Herbert, of which I received twelve plants for experiment last spring, I have never fruited. Marlboro and Louden did well as usual, not much demand for this fruit here. The wild fruit is plentiful.

Currants. Both red and black currants as usual were a fine crop, and taking the labor into consideration, equal to strawberries. The large berries take the eye on the market, but I do not say that they are more profitable to the grower. The demand for white is limited. So far there has not been enough grown to fill the demand, but they are being more extensively planted. A strong, retentive soil, plenty of manure, and frequent renewal of the bearing wood meet about all their

requirements. A moderately heavy clay soil with a full northern exposure is desirable.

Gooseberries. Were as usual a very fine crop. Eleven varieties tested for the first few years. Pearl rather out-yielded any of the others. Since then Golden Prolific and Champion have been ahead of any of the others, Red Jacket coming in third, followed by Industry and Pearl. I have grown gooseberries for over twenty years here, and only once have I seen the English berry affected with mildew, and then it was only on the leaf. I have never grown enough, the difficulty is getting pickers to handle them.

Strawberries are the crop we expect to take most money from. They are grown quite extensively here, and the market is fairly supplied with fresh fruit. I am not prepared to particularly recommend any one variety, as much depends on the soil and season, but the demand here is for a large berry, clean and fresh. The old Wilson would be thought too small, and would not sell like the Glen Mary. The early crop last season suffered somewhat from dry weather. After the rain the crop was good, but not up to some previous years. I do not cover in the fall, but find it necessary to use a fine tooth cultivator between the rows twice in the spring to loosen the surface and conserve the moisture. Formerly only one crop was taken off and the ground plowed, now I take two, and find it better. By having the land perfectly clean and keeping it clean the second crop may be as good as the first. I am trying three-quarters of an acre for 1911 for a third crop as an experiment.

Bubach was possibly the best berry this season.

Recommended for the North.

Apples. *Summer*—Yellow Transparent, Charlemoff, Duchess, Peach, North Star.

Fall and Early Winter—Wealthy, McIntosh, Winter St. Lawrence, Wolf River, Baxter, Louise.

Late Winter—Walbridge, Scott Winter, Pewaukee.

Crab—Whitney, Hyslop, Isham, Florence.

Cherries. If near the influence of the water, Richmond, Montmorency, English Morello, Orel 25, Ostheim.

Plums. *European*—Glass, Lombard, Goliath, Early Red, Trabesh, Pond Seedling. *Americana*—Cheney, Wolf, Hawkeye, Stoddard.

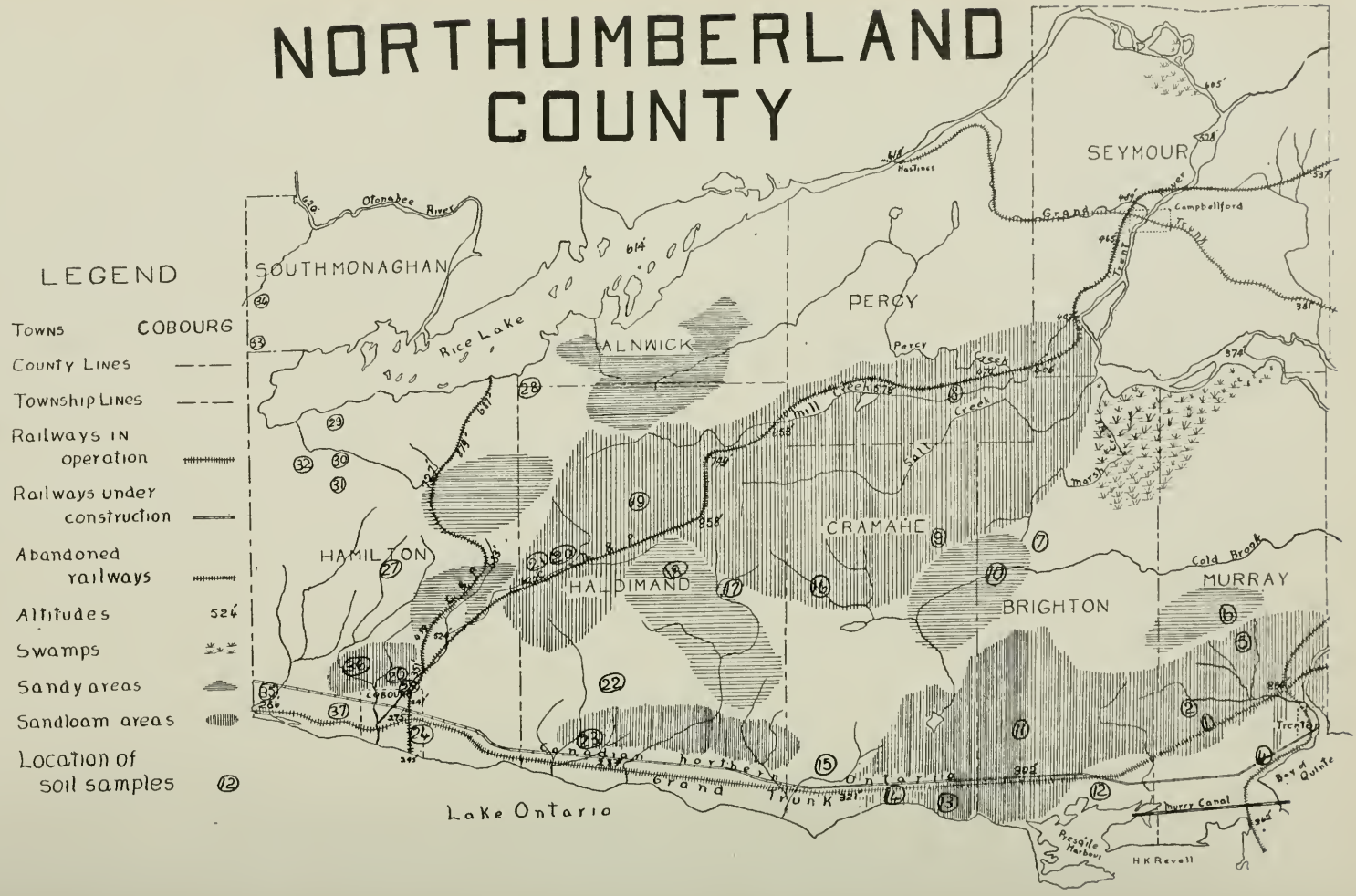
Grapes. Moore's Arctic, Campbell Early, Winchell, Delaware.

Currants. *Red*—Versailles, Red Dutch, for quality; *Black* Victoria, Saunders, Champion.

Gooseberries. Golden Prolific, Champion, Industry, Red Jacket.

Raspberries. *Red*—Marlboro, Louden. *White*—Brinckles Orange for home use only.

NORTHUMBERLAND COUNTY



ORCHARD SURVEY OF NORTHUMBERLAND COUNTY—PART I.

H. K. Revell.

Purpose. This work consists of a systematic inspection of orchards. Its purpose is three-fold, viz:

1. To study the effect of the geologic and soil characters upon the orchard conditions.

2. To collect for comparison data upon the different methods of soil management.

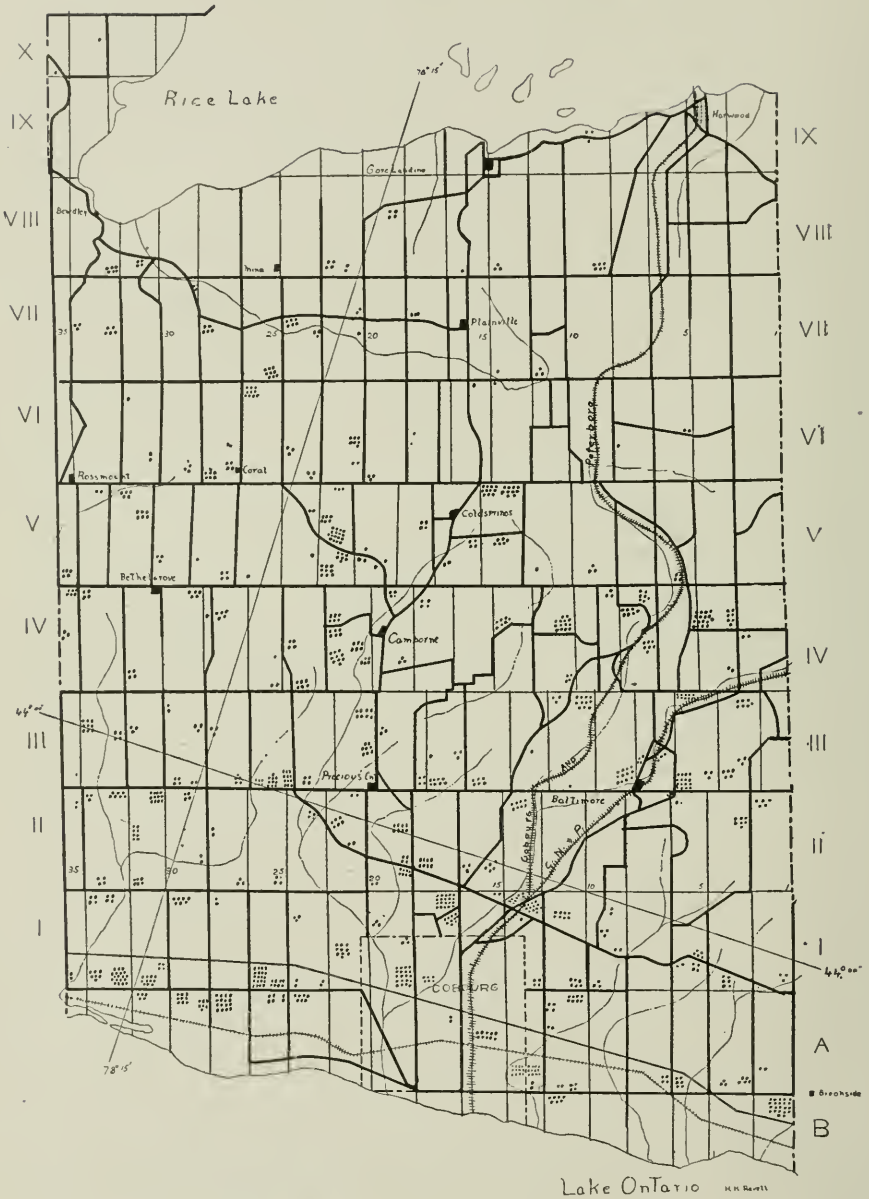
3. To try to arouse a greater interest in orcharding. This last purpose is perhaps the most important. Many men were met who seemed anxious to learn, but were too busy to leave their farms to attend the long or short courses in Horticulture which are held at the various colleges. Some of these men will keep the orchard surveyor busy for an hour or more answering pointed questions. Others there are who appear quite indifferent, but become quite enthusiastic when their attention is drawn to a few of the results of modern orcharding.

Method. In company with Mr. French I was sent to Northumberland County to carry on this work. We first made a preliminary survey of the country, to determine the relations of the townships to one another, and learn where the majority of the orchards were located. This was accomplished by a rapid drive over the territory. A systematic inspection of the orchards was then commenced by driving up and down the side and concession lines, stopping at most of the orchards. At first nearly all orchards of an acre and upwards were visited, but as the work progressed it was found necessary to miss the smaller orchards. When Hamilton Township was completed, we found that the average size of some two hundred orchards was about five and one-half acres. A complete record of every orchard could not be obtained, but sufficient information was collected to enable one to form a very fair idea of the general management of the orchards. The figures are not the results of bookkeeping, but are estimates by each owner of his yields and returns. While some are too high, others are too low, so that the averages obtained are reliable. Just here, I might say, that we are greatly indebted to the farmers, of whom nearly nine hundred were visited, for the courteous manner in which they received us and their willingness to aid us in our work.

Geography. Northumberland County lies on the north shore of Lake Ontario, bounded on the west by Durham, on the north by Peterborough, and on the east by Hastings Counties. Its western and eastern boundaries are, respectively, sixty-five and one hundred and four miles east of Toronto. It has a total area of seven hundred and four square miles. There are nine townships and some sixty towns, villages and post offices. Cobourg, the county seat of the united counties of Durham and Northumberland, is the chief town, with a population of over 5,000. In Alnwick there are some five or six square miles in Indian reservations. Rice Lake, which lies between Peterborough and Northumbrland, has an area of twenty-seven square miles.

Topography. The territory travelled is very hilly and a more picturesque country one could hardly wish for. It is fascinating, indeed, to stand upon any one of the innumerable hills and study the panorama. In many places hill after hill may be seen rising one behind the other, their sides, summits and the valleys between frequently being covered with woods. Here and there on the cleared areas are dotted the farm buildings, with their orchards, some small and others quite large.

HAMILTON


Rice Lake
Hastings
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Millbrook
Bethesda
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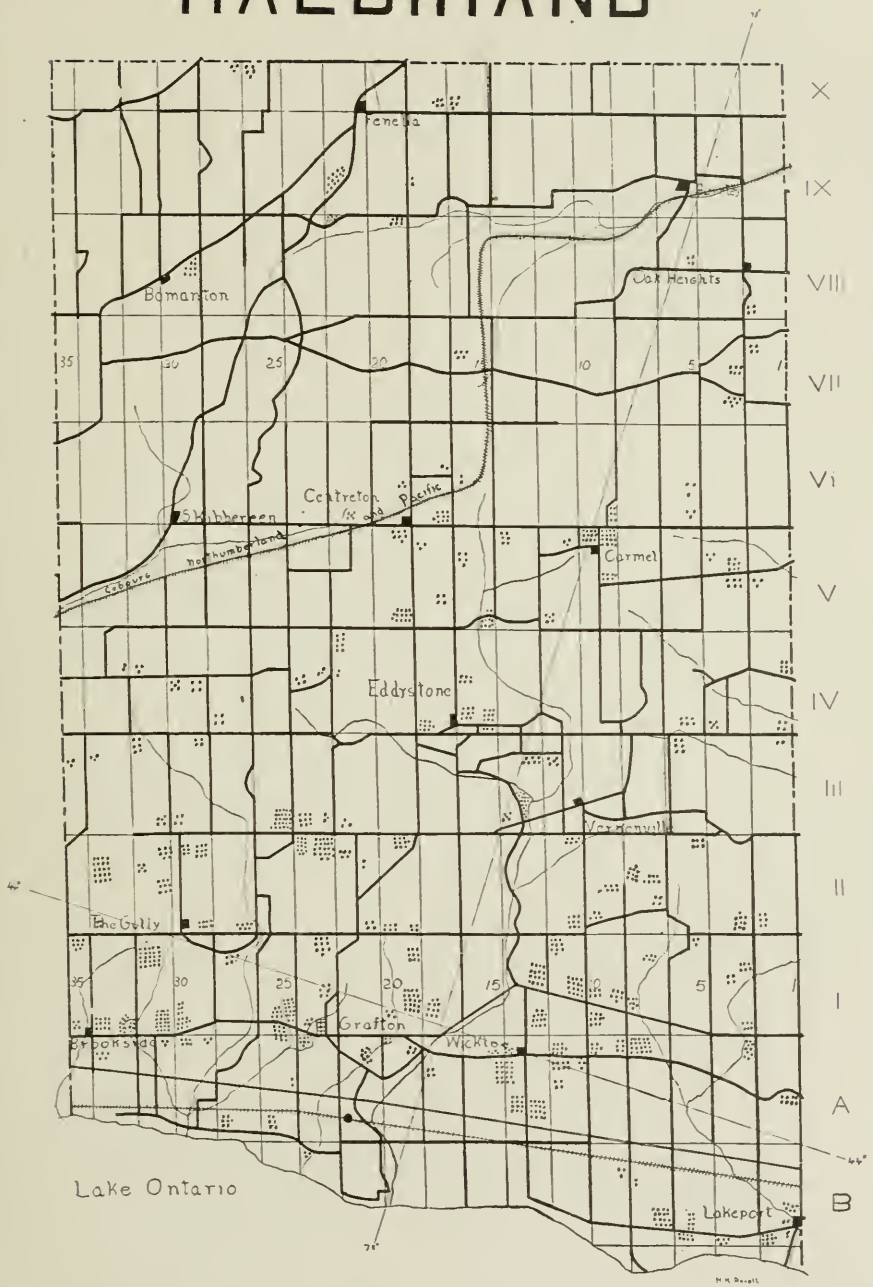
Manvers
Emily
Ops
Fenelon
Verulam
Somerville
Eldon
Bexley
Ennismore
Harvey
Smith
Douro
Dummer
Dysart
Harburn
Anstruther
Chandos
Clyde
Burleigh
Methuen
Asphodel
Belmont
Percy
Seymour
Monaghan
Otonabee
Peterborough
Ashburnham
Smith
Ennismore
Lakefield
Young's Point
Bridgenorth
Stoney Lake
Buckhorn Lake
Chemong Lake
Katchewanooka Lake
Clear Lake
Deer Lake
Pigeon Lake
Sturgeon Lake
Cameron Lake
Pigeon River
Gull River
Gull Lake
Balsam Lake
Cameron
Fenelon Falls
Kinmount
Minden
Haliburton
Lindsay
Omemee
Bobcaygeon
Coboconk
Norland
Victoria Road
Woodville
Kirkfield
Sebright
Canal
Trent
Otonabee
Indian
Gull
Burnt
Scugog
Pigeon
Talbot
Black
Mississauga
Rice Lake
Lake Ontario
Port Hope
Cobourg
Brighton
Colborne
Grafton
Wicklow
Gore Landing
Harwood
Plainville
Coldsprings
Baltimore
Grafton
Precious Corners
Bethesda
Rossmount
Coral
Millbrook
Cavan
Bewdley
Hastings
Campbellcroft
Orono
Newcastle
Bowmanville
Oshawa
Whitby
Pickering
Ajax
Toronto
Scarboro
Markham
Richmond Hill
Vaughan
Woodbridge
Maple
Thornhill
Newmarket
Aurora
Sutton
Georgina
Keswick
Holland Landing
Bradford
Beeton
Tottenham
Alliston
Schomberg
Nobleton
Kettleby
King
Aurora
Stouffville
Uxbridge
Whitchurch
Markham
Scarboro
York
Etobicoke
Toronto
Mississauga
Oakville
Trafalgar
Nelson
Burlington
Dundas
Ancaster
Flamborough
Beverly
Glanford
Binbrook
Saltfleet
Barton
Stoney Creek
Hamilton
Glanbrook
Caledonia
Seneca
Oneida
Onondaga
Cayuga
Dunnville
Wainfleet
Humberstone
Port Colborne
Welland
Crowland
Thorold
Pelham
Niagara
Grimsby
Clinton
Louth
Gainsborough
Grantham
St. Catharines
Niagara Falls
Niagara River
Lake Ontario
Lake Erie
Welland Canal
Welland River
Grand River
Forks of the Grand
Dunnville
Cayuga
Caledonia
Seneca
Oneida
Onondaga
Brantford
Paris
Galt
Preston
Hespeler
Waterloo
Berlin
New Hamburg
Baden
Wellesley
Wilmot
Wellesley
Woolwich
Guelph
Puslinch
Eramosa
Nassagaweya
Esquesing
Nelson
Trafalgar
Oakville
Toronto
Mississauga
Chinguacousy
Albion
Caledon
Erin
Garafraxa
Amaranth
Melancthon
Mono
Adjala
Tecumseth
Tottenham
Alliston
Beeton
Bradford
Holland Landing
Newmarket
Aurora
Sutton
Georgina
Keswick
Uxbridge
Stouffville

HALDIMAND


X
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VIII
VII
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B
Seneca
Bowmanton
Cox Heights
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20
15
10
5
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Centreton
Pacific
Kibbereen
Northumberland
Colburn
Carmel
Eddystone
Van Kenyll
McCully
Grafton
Brooksvale
Wicklow
Lake Ontario
Lakeport

Following the lake shore is a strip of low, more or less flat, land of varying width, sometimes as much as five miles wide. North of this strip the land is of a most uneven contour. Rising rapidly from the lake shore where the elevation above the sea level is about 245 feet, some points in the country are quite high. In Hamilton township, following the line of the old Cobourg and Peterborough Railway, which ran about twenty-five or thirty years ago, an elevation of some 879 feet in the seventh concession is attained. It then descends till Rice Lake is reached, where the water stands at a level of 616 feet. A portion of this road was built on a grade of 1.6 per cent. On the line of the old proposed Cobourg, Northumberland & Pacific Railway, which was surveyed north-easterly from Cobourg through Seymour Township to the Central Ontario Railway and Canadian Pacific Railway junction in Hastings County, an altitude of 958 feet in the sixth concession of Haldimand is attained. The line then descends to the Trent River in Seymour, where the elevation is 400 feet. It again ascends to the townline of Seymour and Hastings, which has an altitude of 537 feet.

Swamps. About 7.5 per cent. of the assessed area for 1908 is classed as "Swamp, marsh or waste land." There are numerous small swampy patches, but the main swamp is in the northern part of Brighton and Murray Townships. This great swamp extends along that part of the Trent River known as Percy Beach for about six or seven miles, and southerly into Brighton for some four or five miles.

Drainage. The territory is well drained naturally, though there are many places which would undoubtedly be improved by underdrains. There are upwards of a dozen small streams and creeks, besides the Otonabee and Trent Rivers. The country has two general drainage basins; the smaller one is drained directly to Lake Ontario, the larger to Rice Lake and the Otonabee and Trent River. These are divided approximately by a line running from the western town line of Hamilton on the seventh concession, easterly through Carmel, Vernonville, south of Edville, through Hilton, and along the third line of Murray to Hastings.

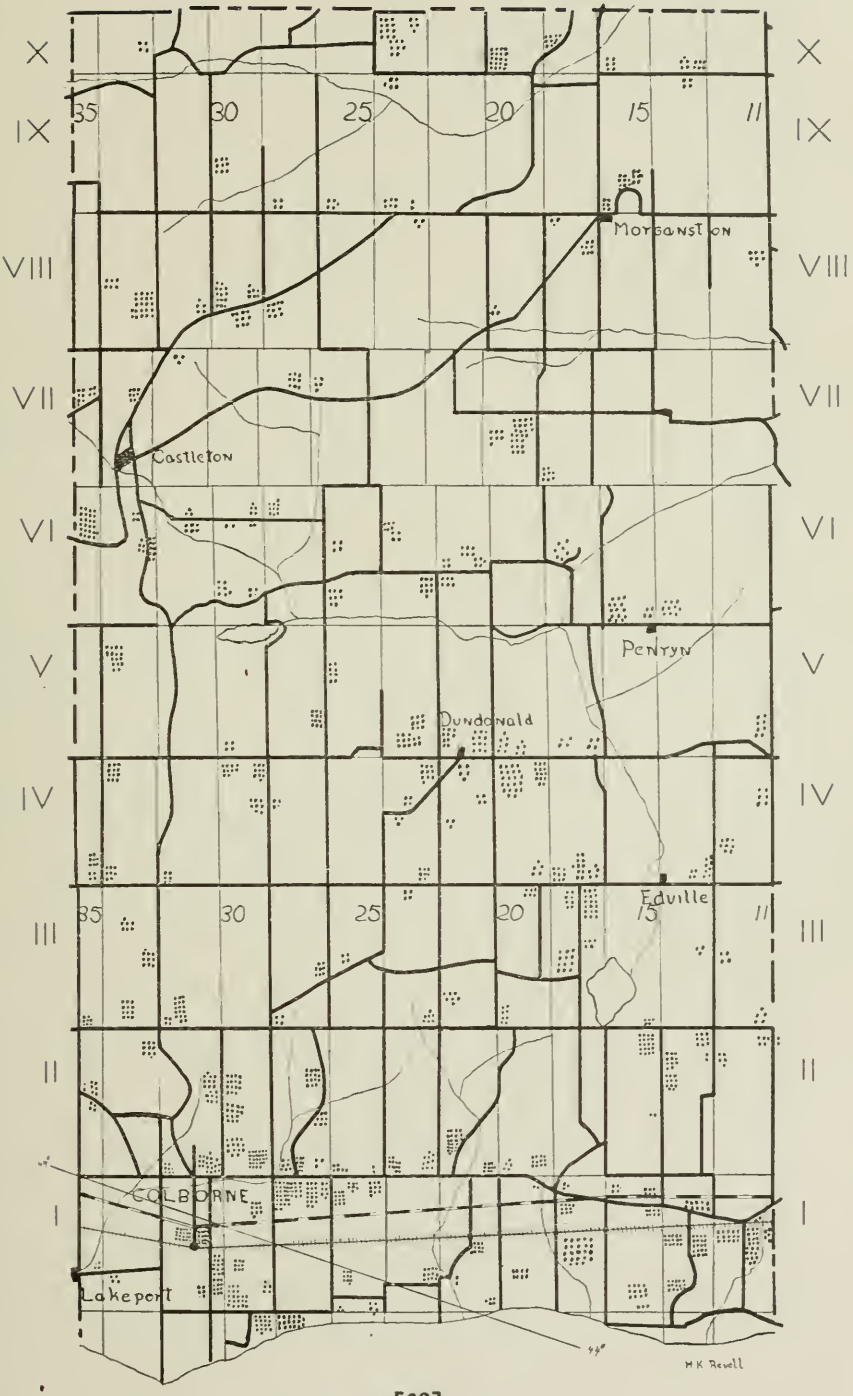
South Monaghan is bounded on three sides by water, Rice Lake to the south, the Otonabee River on the east and north. The majority of the streams run north to the river. Seymour is drained easterly and westerly to the River Trent, which runs through its centre, almost due south for nearly the entire length of the township.

Soil. The soil of Northumberland is very variable, ranging from a stiff clay to a light drift sand. A large portion of the clay lies along the shore of Lake Ontario. In South Monaghan and the other northern townships clay exists in patches. All told, about nine per cent. of the total area is clay. The larger part of the soil is of a loamy nature; about thirty-five per cent. clay loam, and about thirty per cent. sand loam. Scattered throughout the central portion of the county are numerous patches of drift sand. These are especially noticeable in Cramahe and Brighton, near Penryn. In some places the roads and from one-half to two-thirds of the height of the fences are buried in drift sand. But only a small portion of the total area is of this nature; according to the report of the Commission of Agriculture for 1881 about seven per cent. of the county is classed as sand.

In order to obtain an accurate idea of the physical properties of the soil, a number of samples were taken from the more important sections of the county.

These samples were later subjected to a physical analysis, the results being recorded in the following table:

CRAMAHE


X
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VIII
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15
11
Morganston
Castleton
Penryn
Dundonald
Eduille
COLBORNE
Lakeport
H.K. Revell

TABLE 1.

No.	Kind of soil.	Percentage of organic constituents.	No.	Kind of soil.	Percentage of organic constituents.
1	Sandy loam	3.05	20	Light sandy loam	4.58
2	Sandy loam	3.85	21	Light sandy loam	4.52
3	Clay (subsoil)	6.85	22	Loam	4.72
4	Clay loam	7.60	23	Light sandy loam	4.18
5	Light sandy loam	3.36	24	Clay loam	9.62
6	Sand	1.47	25	Light sandy loam	5.73
7	Loam	6.11	26	Light sandy loam	4.27
8	Light sandy loam	2.93	27	Loam	3.77
9	Sandy loam	3.96	28	Clay loam	4.40
10	Light sandy loam	2.42	29	Loam (subsoil)	3.00
11	Sandy loam	4.14	30	Sandy loam	3.61
12	Loam	6.36	31	Sandy loam	6.74
*13	Light sandy loam	21.58	32	Clay loam	8.79
14	Sandy loam	6.47	33	Light sandy loam	6.54
15	Loam	4.25	34	Clay loam (subsoil)	6.23
16	Light sandy loam	3.05	35	Loam	5.05
17	Light sandy loam	4.09	36	Sand loam	5.75
18	Sand	5.11	37	Loam	9.94
19	Light sandy loam	3.61			

*Soil Number 13 was obtained from a swale of black muck.

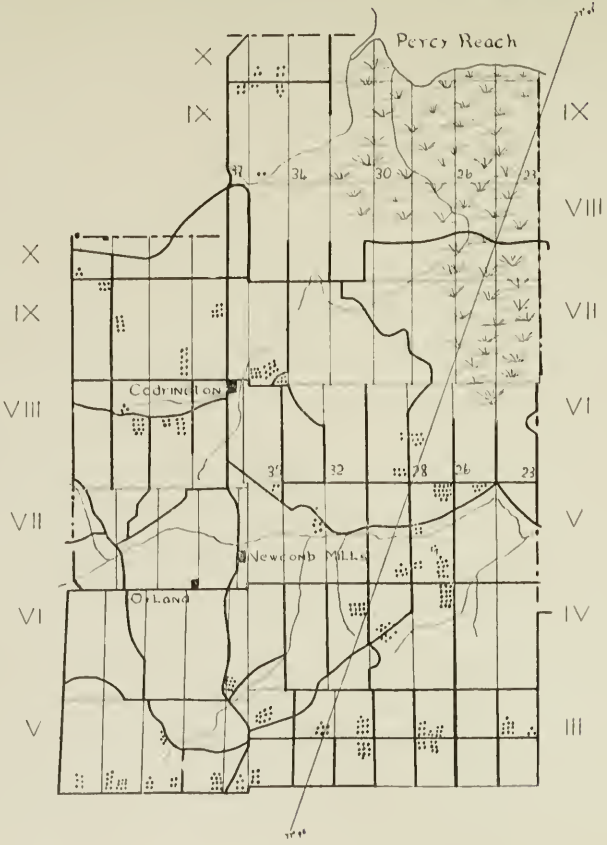
The numbers of the samples are recorded on the county map by figures within a circle. Only those sections of the county where the soil was more or less uniform in character and of a known definite area are recorded on the map. In the unshaded sections where the soil is known the areas are very patchy, and for this reason are not recorded.

There are also patches of gravel and black loam scattered throughout the territory, about nine and ten per cent. respectively. The greater part of the black loam occurs in Brighton, Murray and Percy, with some in Cramahe.

CLIMATE. Without doubt the climate of Northumberland is admirably suited to the production of a high-class apple with good keeping qualities. This is amply proved by the quantity and quality now being produced. Mr. H. B. Smith says, in his "Climate of Ontario and Some Phases of its Influence on the Growth of Agricultural Crops," with respect to apples: "This fruit cannot be produced with certainty or success northward of zone five, and even in this zone the varieties that may be cultivated are somewhat limited. In zone one, embracing the counties of Essex, Kent and the Niagara fruit districts, any variety of apple, or in fact almost any kind of fruit not particularly confined to the tropics, may be grown with at least fairly average success. In zone two, where the summer temperature is two degrees lower, and the season seven days shorter, apples are a staple crop. In zone three they are extensively produced, but perhaps the limits of zone four mark the northerly limit of the commercial cultivation of this fruit. Beyond this, in zone five, considerable areas are devoted to it, but the quality of the product is so much inferior to that grown in the true fruit districts, the risk of failure due to adverse climatic conditions so great, that apple growing can never be made a prominent feature of the agriculture of this region."

Northumberland is located in what is known as the middle Canadian Alleghanian Area, or zone number three as mentioned in Mr. Smith's thesis.

BRIGHTON


Percy Reach
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IX
VIII
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VI
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IV
III
Codrington
Newcomb Mills
Orland
36
30
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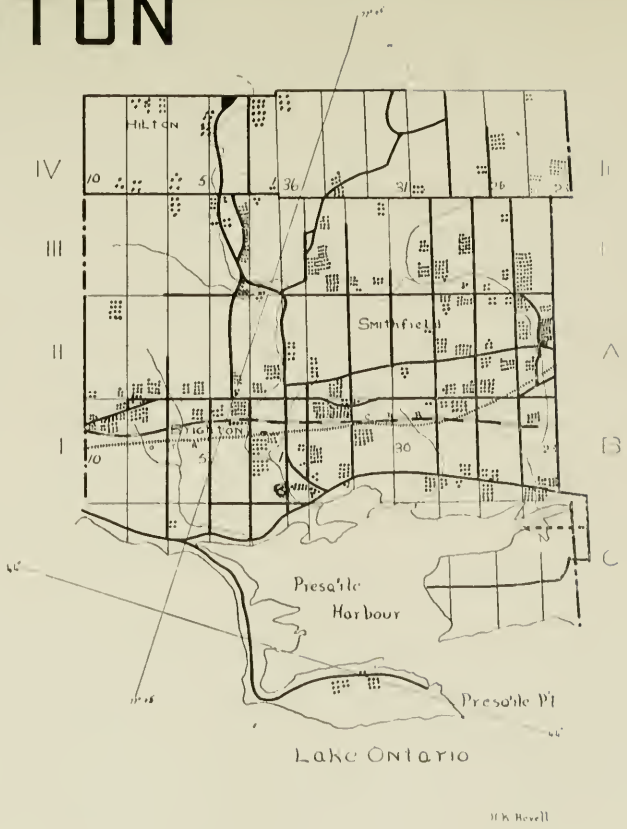
28


HILTON
Smithfield
Brighton
Presqu'ile
Harbour
Presqu'ile Pt
Lake Ontario
IV
III
II
I
A
B
C
36
30

I propose to study the climate of this section of country by comparing its meteorological characteristics with those of other fruit sections. For this purpose I have used figures taken from the reports of the Dominion and United States Weather Bureaus, and from the theses of Messrs. H. B. Smith, of 1906, and O. C. White, 1910. Unfortunately, there have been no weather reporting stations located in Northumberland for any length of time. I have therefore used the averages of the readings from the stations located at Toronto, Port Hope, Peterborough, Deseronto and Kingston, as giving a fair idea of the weather conditions on the north shore of Lake Ontario.

Temperature is undoubtedly the most important climatic consideration in fruit growing. While the amount of precipitation may be augmented by irrigation, very little, if anything, can be done to control the temperature of a locality for any length of time. Table 3 gives the mean monthly and annual temperatures for the several districts under consideration.

The meteorological readings in Tables 1, 2 and 3 are the averages of the following stations, the figures for Ontario being taken from thesis of H. B. Smith, 1906; those for British Columbia from thesis of O. C. White, 1910, and those for United States sections from the United States Meteorological Survey.

Essex County, at Pelee Island and Windsor.

Niagara District, at Stony Creek and Welland.

Georgian Bay District, at Collingwood, Owen Sound, Meaford, Lucknow and Rocklyn.

North Shore Lake Ontario, at Toronto, Port Hope, Peterborough, Deseronto and Kingston.

Okanagan Valley, B.C., at Okanagan Mission, Vernon, and Summerland.

Southern California, at Rialto and San Bernardine.

Plants grow only between certain definite temperatures, the minimum being forty-three, Fahrenheit. Hence the number of days above this temperature is an important consideration. The total number of heat units received, the average temperature of the six hottest weeks, and the period of growth, form interesting climatal data. These figures are given in Table 2.

TABLE 2.

——	Period of growth.	Total heat units received.	Mean temp. of six hottest weeks.	No. of days of growth.
Essex County	April 10—Nov. 7 ..	13,116	71.5°F.	210.5
Niagara District	April 13—Nov. 7 ..	12,368	70.2°	204.0
Georgian Bay District	April 17—Oct. 27..	11,128	66.26°	193.0
North Shore, Lake Ontario.....	April 18—Oct. 25..	11,498	68.6°	190.2
Okanagan Valley, B.C.....	April 4—Oct. 24...	11,658	66.7°	203.0

The mean monthly and total annual rainfall of a locality demand some attention. This information, together with the distribution of the precipitation, is given in inches in Table 4.

TABLE 3.—MEAN MONTHLY AND ANNUAL TEMPERATURES.

(Fahrenheit degrees.)

—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Essex County	23.9	24.9	32.1	44.9	57.6	67.8	75.5	71.6	64.0	52.8	39.6	29.0	48.4
Niagara District	23.3	22.8	29.9	43.8	55.3	66.0	70.7	68.7	62.0	50.0	38.6	28.9	47.6
Georgian Bay District	20.0	17.6	27.4	41.1	42.5	60.9	66.8	66.6	58.9	48.1	35.1	23.2	43.0
North Shore Lake Ontario	18.6	19.2	27.9	42.5	54.3	64.2	69.0	67.3	60.0	57.4	34.8	24.1	44.1
Okanagan Valley, B.C.	25.0	26.8	35.8	46.8	54.7	61.1	67.2	64.9	55.9	46.1	35.8	29.2	45.8

TABLE 4—MEAN MONTHLY AND ANNUAL PRECIPITATION IN INCHES.

District.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
Essex County	2.49	2.75	2.47	2.48	3.33	3.23	3.27	2.78	2.06	2.02	2.62	2.29	31.32
Niagara District	3.91	3.27	3.63	2.32	2.66	2.47	3.08	1.77	3.00	2.27	3.11	2.98	34.49
Georgian Bay	4.23	2.66	2.50	1.93	2.92	2.90	3.69	3.11	3.26	3.06	3.47	4.50	38.40
North Shore, Lake Ontario	3.09	2.80	2.66	2.06	2.82	2.52	2.80	3.07	2.87	2.33	2.93	2.84	32.79
Okanagan Valley, B.C.	0.99	1.02	0.79	0.35	1.54	1.10	0.99	1.14	1.39	0.38	2.38	1.04	13.21
Southern California	6.39	5.22	2.91	1.19	0.61	0.01	0.02	0.00	1.40	2.25	0.55	1.36	21.92

Irrigation is often made necessary by an uneven distribution of the precipitation throughout the seasons. In the preceding table three western sections have been compared with Ontario. In all of these irrigation is practised, especially in the Okanagan Valley and in Southern California. In the latter case I have used the averages of precipitations from weather reporting stations in the heart of the orange section. Though apples are not grown very extensively in this section, it has been used to illustrate the uneven distribution of the total annual precipitation. These orchards are irrigated five or six times a year.

As Northumberland is located between Rice Lake and Lake Ontario, the climate must be greatly influenced by these bodies of water. This is splendidly illustrated by a comparison of the meteorological readings taken at Toronto and Agincourt. The distance between these two places is less than fifteen miles, but as Agincourt is inland its climate is more severe. This fact is verified by the following tables. The most noticeable difference is in the temperatures, Agincourt being much colder in the winter and much warmer in the summer.

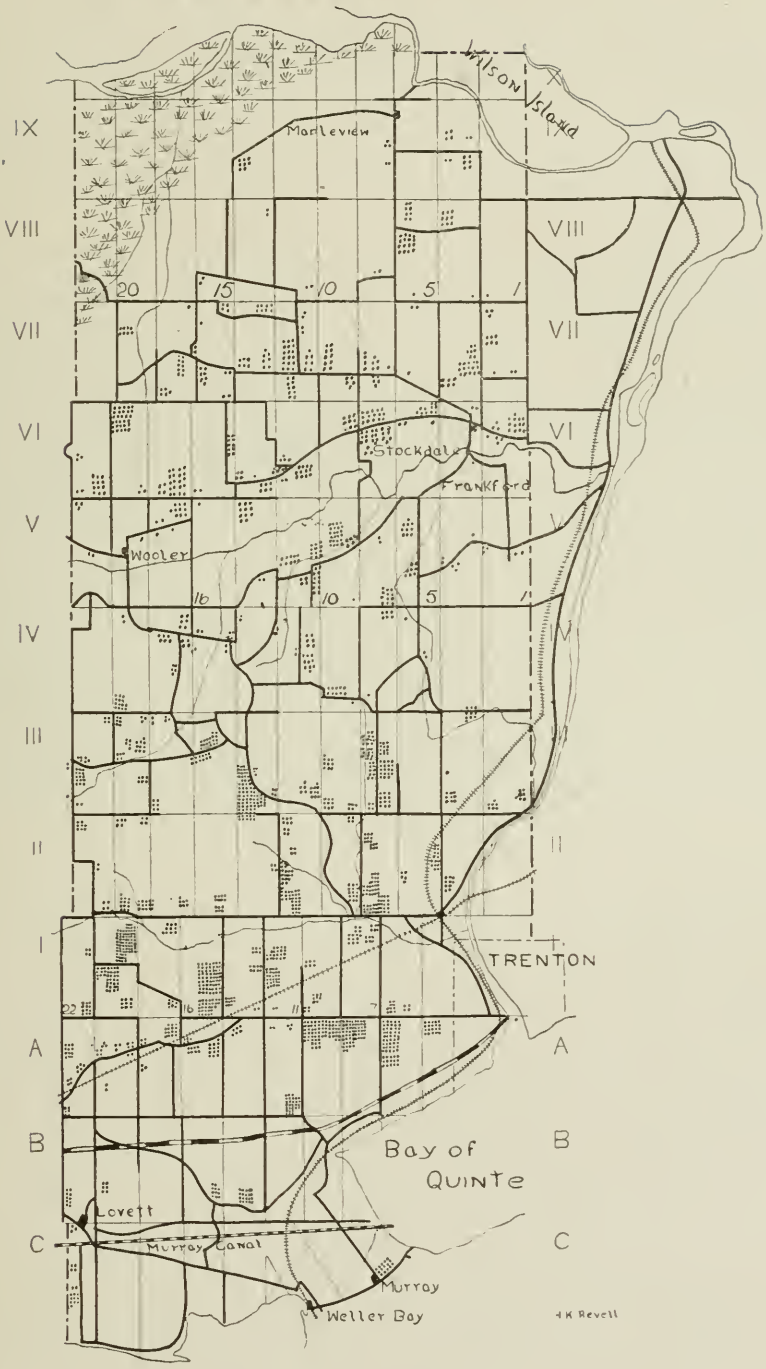
TABLE No. 5.

——	Period of growth.	Total heat unit received.	Temperature of six hottest weeks.	Length of growing season.
Toronto	April 20—Oct. 25....	10,983	67.5	187 days.
Agincourt	April 15—Oct. 28....	11,666	68.9	196 "

TABLE 6 AND 7—MEAN MONTHLY AND ANNUAL PRECIPITATION AND TEMPERATURES

MONTHS	PRECIPITATION		TEMPERATURE	
	Toronto	Agincourt	Toronto	Agincourt
	Inches	Inches	Degrees	Degrees
January	2.82	2.21	22.6	19.6
February	2.53	1.36	22.4	17.7
March	2.55	2.49	28.8	29.2
April	2.55	3.12	41.3	43.1
May	2.75	2.65	52.4	54.3
June	2.63	3.16	62.6	62.5
July	2.50	4.32	67.6	69.5
August	2.54	2.41	66.2	67.2
September	2.76	1.99	58.6	60.4
October	2.42	1.88	46.4	49.6
November	2.91	1.31	36.1	35.7
December	2.59	2.32	26.3	23.3
The year	31.08	29.22	44.3	44.3

MURRAY


Wilson Island
Marleview
Stockdale
Frankford
Wooler
TRENTON
Bay of Quinte
Lovett
Murray Canal
Murray
Weller Bay
H K Revell

Winter Injury. There are many forms of winter injury to fruit trees. The one most frequently seen was the sun-scald. This is nearly always found on the south and south-west sides of the trunks and main limbs. It is due to alternate freezing and thawing, causing the bark to split and fall off. Exposed trunks should be shaded on the south-west side during the season of bright sun and freezing nights of late winter. The heads of trees should be kept only moderately thinned out, in order to avoid exposal of the upper surfaces of the branches to strong sunshine. Badly affected varieties would do better if top-worked on trunks of hardy sorts. The low heading of trees is also very helpful, as this leaves much less trunk exposed to the sun.

A Northumberland Sand Dune.

Root killing is another form of winter injury. This was noticed particularly in those orchards situated on low-lying, wet lands. The remedy for this condition is better under-drainage and proper soil management in order to prevent late fall growth.

Varieties. All told, about sixty varieties of apples were mentioned, but of these not more than a dozen are being planted commercially. The following eight are those which were most frequently mentioned, their ratios of popularity being also indicated. Many of the Tolmans were set to graft to Spys, but as at time of inspection they had not been grafted, they were counted as Tolmans.

Table 8.—Most Popular Varieties and their Ratios of Popularity.

Variety	No. of times mentioned.	Ratio.
Ben Davis	841	5.35
Spy	699	4.46
Stark	489	3.11
Baldwin	411	2.61
Golden Russet	368	2.34
R. I. Greening	217	1.38
Snow	163	1.03
Tolman	157	1.00

The varieties were classed according to date of setting. The following table shows what varieties were set in the different decades. Briefly summarized, only the winter sorts were set previous to 1870. Since then a preference for fall and early winter varieties has crept in with the additional plantings. The winter apples, however, maintain their lead. Table 8 is a summary of the settings of some thirty varieties for the five periods of time. In Table 9 the figures given indicate the numbers of orchards containing the different varieties. As definite information could not be obtained in all cases, only those orchards where the date of planting was certain could be utilized. Hence, the figures are more or less relative.

TABLE 9.

Variety.	Set previous to 1870.	1870–1880	1880–1890	1890–1900	1900–1910
Alexander	1	0	1	2	6
Astrachan	0	6	6	0	1
Baldwin	6	58	42	43	73
Baxter	0	1	1	10	27
Bellflower	0	9	13	6	2
Ben Davis	5	55	63	100	191
Blenheim	0	0	3	0	4
Canada Red	1	8	4	0	4
Cooper Market	0	4	4	5	10
Colvert	3	90	8	3	2
Cranberry	1	3	1	10	54
Delaware Red	0	1	1	0	11
Duchess	0	11	3	3	6
Fallawater	0	1	0	1	5
Gano	0	2	5	11	51
Greening	4	48	40	23	18
Hubbardston	0	2	1	0	1
King	1	13	11	17	6
McIntosh	0	1	2	2	2
Mann	1	1	4	7	15
Ontario	1	2	2	4	17
Pewaukee	0	1	8	16	3
Russet	7	72	74	43	38
Salome	0	1	0	0	7
Seek	1	3	4	2	1
St. Lawrence	0	0	4	2	0
Snow	1	19	23	11	21
Spy	11	88	89	74	115
Stark	2	4	12	23	167
Tolman	3	20	15	8	20
Wagener	0	3	4	2	10
Wealthy	0	3	3	12	28
Wolf River	0	0	0	2	8

During the twenty years 1880 to 1900 there was a decline in the number of plantings of some varieties. Some of these continue decreasing, while others increase during the period from 1900 to 1910. This is significant of three points: (1) The early apples being unsuitable for export decreased, though some of these increased again with the advent of better shipping facilities and cold storage; (2) Those varieties which are unsuitable commercially have disappeared almost entirely; (3) Varieties subject to scab decreased with the increasing prevalence of that disease from 1890 to 1900, but with the introduction of spraying during the past decade have again increased. But all through these periods Stark, Ben Davis, and Spy have rapidly increased—the first over 700 per cent., the second nearly 200 per cent., and the third over 50 per cent.

NURSERY STOCK. Most of the nursery stock is secured from Ontario nursery

men, though a little comes from New York State. Of the Ontario stock, the greater part comes from the nurseries in the Niagara Peninsula, very little being grown in Northumberland itself.

The quality of the stock is very poor indeed, and almost nothing is being done by the farmers to secure first-class trees. The remark was noted on several occasions, "I know I should not have set them out." If these men knew the stock was inferior and yet accepted it, then they, and they alone, are to blame. Some have asked for legislation to prevent substitution of varieties, and of inferior for first-class stock. But the most effective legislation lies in the contract which is drawn up between the purchaser and seller. Some claim that the farmers do not known what constitutes a first-class tree, but in answer to this we might say that they are nearly always able to distinguish the poor trees in their orchards.

The majority of men seem to prefer to set trees three or more years old, believing that they are saving time. Though it has not been proved conclusively, most authorities claim that a one or two year old tree will in a short time equal in development an older tree set at the same time. If the younger trees are selected, the owner has better control over them in determining the shape and height of head. Some of the more noticeable faults of the stock were twisted and crooked trunks, crotchy heads, and lack of uniformity in shape and height of heads. These are faults which can be remedied most easily by the setting of one or two year olds, preferably strong one-year-old stock.

Slopes. In selecting a site for the orchard the question is often asked, "In what direction should the land slope?" The results of surveys in New York State support the preference of some for easterly slopes. Our results, however, rather point to the contrary. We found so many orchards which were practically level that they also have been included in the table. The yields given are the average per acre for the last three years.

TABLE 10.

No. of orchards.	No. of acres.	Slope.	Average yield per acre per year for three years
17	84.5	North to north-west	46.056 Bbls.
33	190.25	Level	42.936 "
112	678	South to south-east	39.676 "
22	114.25	West to south-west	37.360 "
20	193.5	East to north-east	26.633 "

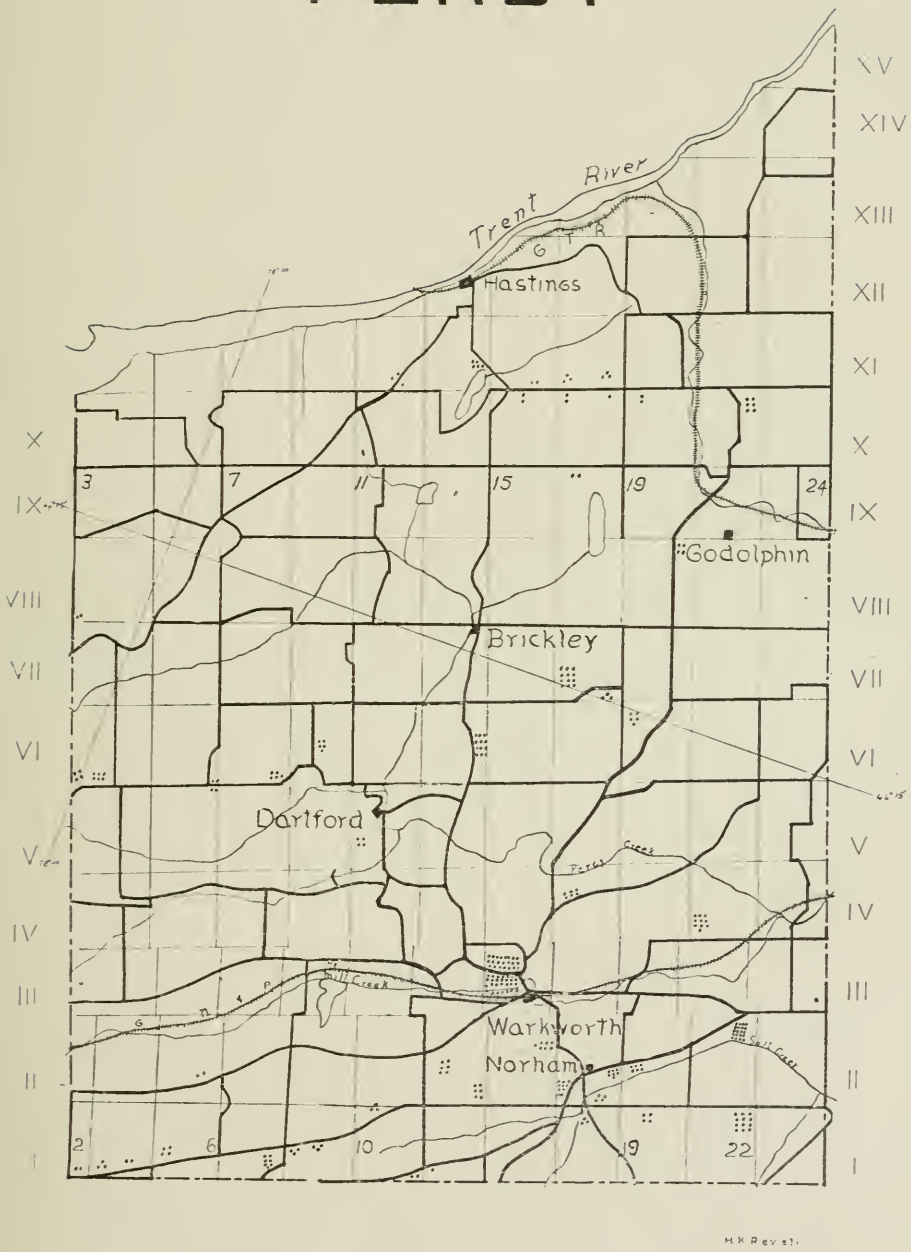
NOTE.—In all the tables the yields are the average for the years 1907, 1908 and 1909.

Soils. "On what soil does the apple do best?" is often asked. The answer generally given is that it will do well on any well-drained soil. The following table gives a comparison of the Northumberland soils.

TABLE 11 (SOILS.)

No. of orchards.	No. of acres.	Soil.	Average yield per acre per year for three years.
30	173.25	Clay	48.54 Bbls.
46	201.25	Clay loam	42.82 "
85	501.50	Sand loam	36.59 "

PERCY


Trent River
G T R
Hastings
Godolphin
Brickley
Dartford
Warkworth
Norham
Percy Creek
Mill Creek
Mill Creek
G n t R
H K Pevest.
XV
XIV
XIII
XII
XI
X
IX
VIII
VII
VI
V
IV
III
II
I
3
7
11
15
19
24
2
6
10
19
22

Distance of Planting. This question has provoked a great deal of discussion. Some claim that within due limits the farther apart the trees are, the more fruit each individual will bear, and therefore the production will be so much more per acre. On the other hand, there are those who say that the increased number of trees will more than make up for the lessened yield of each individual. The following table seems to bear out the latter contention.

Table 12—(Distance).

No. of orchards.	No. of acres.	Distance.	Average yield per acre.
49	292.5	25 ft. x 25 ft., or less	45.07 Bbls.
28	147.5	31 ft. x 31 ft. to 35 ft. x 35 ft.	42.75 "
94	499.75	26 ft. x 26 ft. to 30 ft. x 30 ft.	42.453 "
5	44.00	36 ft. x 36 ft. or farther apart.	33.406 "

This table gives results in *barrels per acre,* but it must not be supposed that the results would be the same if they were figured on a basis of *dollars per acre.* Close planting gives a larger percenage of poorly colored apples, and consequently a *lower price per barrel,* and probably a *lower price per acre.* The distances recommended are 35 x 35 for large-growing winter sorts, such as Spy; 30 x 30 or 30 x 35 for Ben Davis and similar sorts, and 25 x 25 or 25 x 30 for such as Wealthy.

Orchards on Rented Land. Quite frequently we were informed by the farmers that it would not pay them to give their orchards any better care, because they themselves were "just tenants." To ascertain what effect renting the farm and orchard usually had upon the orchard yields, a comparison was made of the yields from orchards on rented land with those on land which the owners themselves were caring for. The following table does not speak very favorably for the tenant.

Table 13.—Rented vs. Owned Orchards.

——	No. of orchards	No. of acres.	Average yield per acre in barrels.		
			1907	1908	1909
Rented	13	109.00	38.20	20.01	28.33
Owned	222	1,304.75	61.90	35.46	42.05

Soil Management. Under the heading soil management we have three general subdivisions, viz.: Underdrainage, cultivation and fertilization. These we will consider in order mentioned.

Underdrainage. Very little underdrainage has been done in Northumberland. Only 8.38 per cent. of all orchards have any underdrains, and not more than two or three are completely tile drained. In spite of this, however, a very small percentage of the orchards could be classed as poorly drained.

It is well known that apples will not thrive on a wet soil. Scattered throughout the country are to be seen whole or parts of orchards on low-lying wet lands. Even the untrained eye will note the difference in the trees. Those on the well-

drained soil have a darker foliage; they are also larger and freer from disease and insect pests. In many of the old orchards situated on the side or at the foot of a hill, there will be found places with the trees missing at the lower end, while on the higher location all the trees are living and healthy. There is only one hypothesis to explain such a case as this, and that is the better drainage.

To show the difference between good and poor drainage, the clean cultivated orchards having any artificial drains have been compared with the clean cultivated orchards having no drains of any kind. A large portion of those orchards classed as artificially drained have only one or two underdrains in a low corner, the remainder of the site being well drained naturally.

TABLE 14—(DRAINAGE.)

—	No. of orchards.	No. of acres.	Average yield per acre in barrels.		
			1907	1908	1909
Artificially drained.....	13	96.5	69.98	47.15	35.91
Naturally drained.....	73	529.25	52.73	27.15	31.62

In the preceding table only clean cultivated orchards were considered.

CULTIVATION. Commonly speaking, there are three methods of cultivation in the orchard, viz.: Clean cultivation, growing of crops and sod. These methods have numerous variations in their details, but we shall only consider them in general, using for comparison the averages of the yields from orchards receiving as nearly as possible the same treatment, so far as pruning, spraying and fertilizing are concerned.

Clean cultivation is generally recommended as the best method. Briefly stated, some of its advantages are, greater freedom from such insect pests as the apple maggot or Railroad Worm and the Buffalo Tree Hopper, which are always more numerous in sod orchards; greater freedom from noxious weeds; the trees receive more benefit from the plant food stored in the soil, and the orchard has fuller control of the growth of the trees. Some claim they can grow better crops of apples in sod than in cultivated orchards. There are, of course, exceptions to all rules, but the following table shows quite plainly the results of different methods of soil management:

TABLE 15.—(SOIL MANAGEMENT).

—	No. of orchards.	No. of acres.	Average yield per acre per year in barrels.		
			1907	1908	1909
			Bbls.	Bbls.	Bbls.
Clean cultivated.....	34	180.00	56.81	42.34	50.40
Farm rotation.....	23	86.25	48.81	30.19	41.91
Sod.....	9	18.80	41.64	33.03	39.20

The orchards used in the preceding table were pruned, fertilized and not sprayed, for the reason there are too few sprayed orchards in sod to give a basis for comparison.

The clean, cultivated orchards are also better than the orchards that are cropped. Some follow a regular system of farm rotation in the orchard, while others plant only hoe crops. Some plant the hoe crops as an inducement to cultivation in the orchard. To these men the orchard is a secondary consideration, their interest lying in the farm crops. It would be better for them to dig out the orchard so that the farm crops might receive the full benefit of the sunlight, moisture and plant food. In a section of country which has a severe winter such as Northumberland, there is danger through the use of hoe crops of forcing growth too late in the season, which greatly augments the likelihood of winter injury.

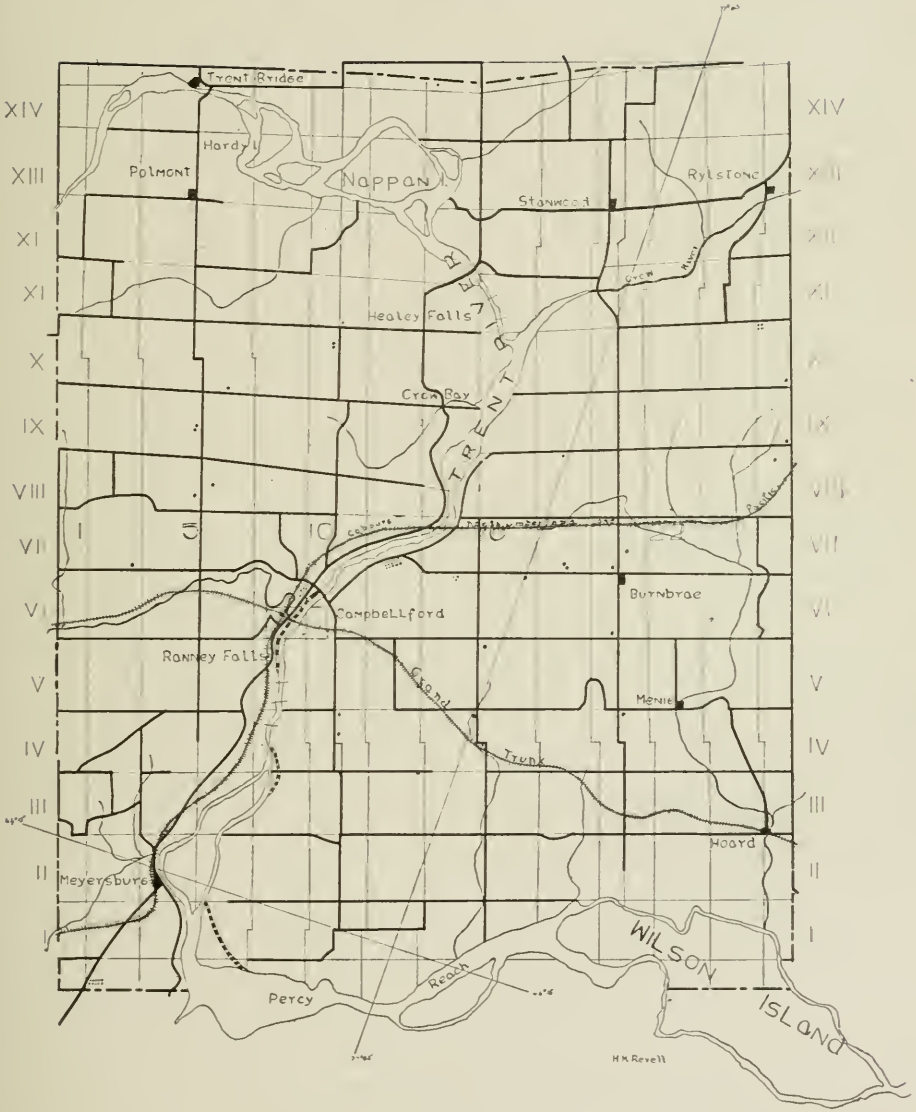
The practice of the best growers in Northumberland County is to spring plow as early as ground can be worked. Thorough clean cultivation is then given with spring tooth or other cultivator or with disc harrow every week or ten days if possible and *after every rain.* At the last cultivation, which in an ordinary season would be between June 15th and July 1st, a cover crop is sown. This is allowed to grow for the balance of the season and is turned under the *following spring.* Some of the best crops for covers are rye, 2 to 3 bushels per acre; rape 4 lbs. per acre; buckwheat, 2 to 3 pecks per acre; red clover, 12 to 16 lbs. per acre, and hairy vetch at the rate of 25 to 30 lbs. per acre.

The men who crop their orchards think they are doing well to get two crops, while the land occupied by the clean cultivated orchard only produces one crop. But the clean cultivated orchard will produce a greater quantity of better apples than the orchard that produces a crop of grain in addition. To illustrate this point, the best fifteen clean cultivated orchards which were pruned, fertilized and not sprayed were compared with the best fifteen cropped orchards, which were pruned and, fertilized similarly to the clean cultivated orchards, and not sprayed. The average yield per acre in the clean cultivated orchards was 77.54 barrels per acre per year, in the cropped orchards it was 44.48 barrels per acre per year, a difference of 33 barrels in favor of the clean cultivated orchards. If these apples were sold at $1.25 per barrel, the clean cultivated orchard would produce $41.25 more than the cropped orchard. But the question may be asked, "Will not the field crop from the one orchard equal in value the extra apples from the other orchard? To ascertain this, we have used the market value of several field crops in Northumberland in 1909. When we divide the $41.25 by this price, we have the number of tons or bushels per acre that must be produced of that particular crop for the cropped orchard to equal the clean cultivated orchard in gross returns. This yield has been compared with the average yield per acre in Northumberland for the past twenty-eight years. Table 16 contains some interesting comparisons:

TABLE 16.

Crop.	Price in 1909.	Average yield per acre for past 28 years.	Yield necessary to equal value of extra apples.
	Cents.	Bus.	Bus.
Fall Wheat	103.0	22.0	40.04
Spring Wheat	101.0	13.1	40.84
Barley	56.5	24.5	73.00
Oats	39.7	32.9	103.90
Peas	91.0	18.3	45.32
Beans	145.0	16.9	28.44
Rye	67.5	15.2	61.66
Buckwheat	51.8	24.0	79.63
Corn (Husked)	47.7	63.1	86.47
Hay	1,394.0	1.14 tons.	3.02 tons.

SEYMOUR


Trent Ridge
Hardy
Nappan
Palmont
Stanwood
Rylstone
Healey Falls
Cryer Bay
TRENT
Campbellford
Burnbrae
Ranney Falls
Grand Trunk
Menie
Hoard
Meyersburg
Percy
Reach
WILSON ISLAND
H.M. Revell
XIV
XIII
XI
X
IX
VIII
VII
VI
V
IV
III
II
I

The average prices and yields used in this table were obtained from the 1909 report of the Ontario Bureau of Industries.

Fertilization. So little commercial fertilizer was used that it has been disregarded in discussing fertilization, barnyard manure only being considered. The orchards were classed according to the quantity of manure applied, and in all cases they were clean cultivated, pruned and sprayed. The only conclusive evidence obtained, is in the comparison of the yields from the orchards which were poorly fertilized with those from the orchards receiving over six loads of manure per acre per year. The general conclusion reached is that the annual use of a medium quantity of manure is better than either too little or too much. The orchards receiving over ten loads of manure per acre yearly, with one exception, have not yielded so much as those receiving from six to ten loads. This is probably due to the fact, that the heavily fertilized orchards made excessive wood growth to the sacrifice of fruit production. Had these orchards received a proportionate quantity of phosphoric acid and potash in addition to the nitrogen applied, their yields would undoubtedly have been much larger.

Table 17.—(Fertilization).

Orchards receiving per acre yearly.	No of orchards.	No. of acres.	Yield in barrels.			
			1907	1908	1809	Average.
Up to 5 loads	7	66.5	51.06	26.60	33.32	36.99
From 6–10 "	41	366.0	59.91	34.54	46.68	47.04
" 11–15 "	24	169.0	54.12	30.78	35.68	40.19
" 16 and up	28	209.0	58.01	38.22	32.32	42.85

Present Condition and Extent. Though there are odd orchards here and there of sour cherries, pears and plums, practically all the orchards are set to apples. From the evidence gathered it seems that the industry in Northumberland, like that in many other favored sections, is thriving. But it must not be taken for granted that such is the case over the country at large. A few months ago one of our authorities was severely censured for stating that the apple industry in Ontario had declined in the past fifteen years. Though we have no figures for Ontario to prove this statement it is the only conclusion that one can come to, when after travelling the length and breadth of this Province, the number of neglected and decrepit orchards is compared with the number which are well cared for and in a flourishing condition. In this connection a few figures from the United States Census may be interesting. These show, that though the industry may be growing by leaps and bounds in the north-western States, it has, on the whole, rapidly declined.

The average yearly yields in the United States were:

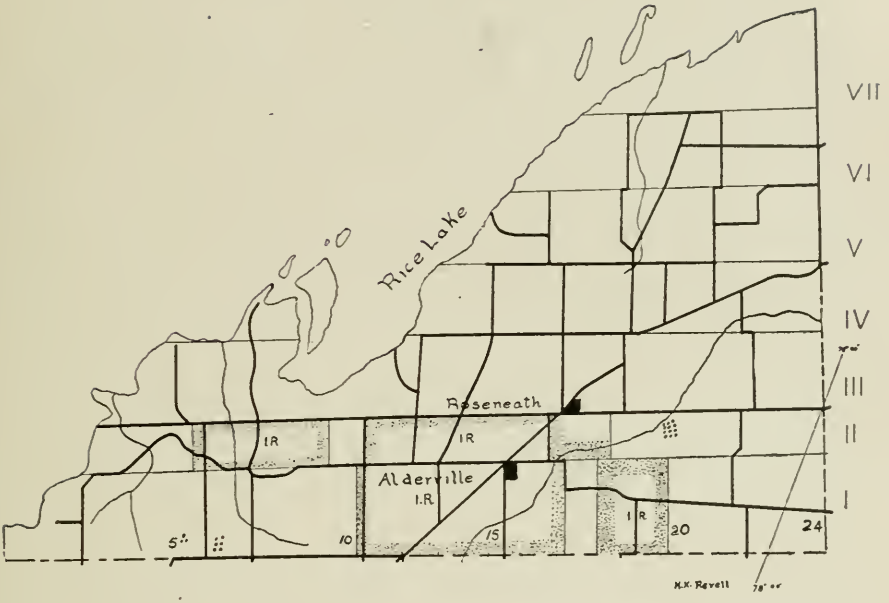
From 1895 to 1900 inclusive was 51,619,000 barrels.

From 1901 to 1905 inclusive was 44,480,200 barrels.

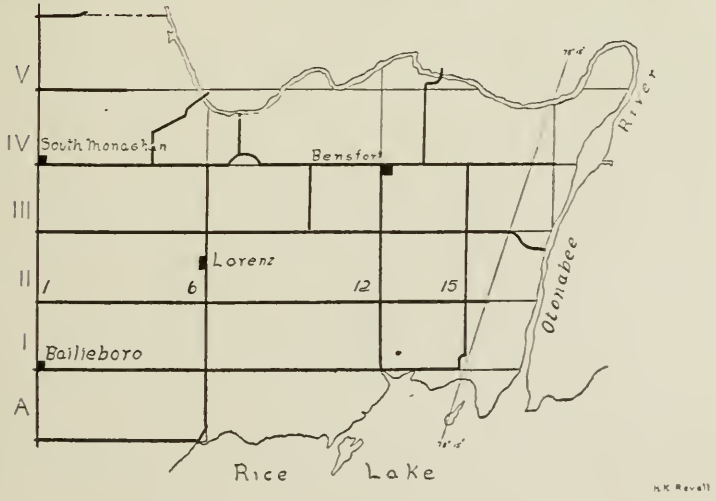
From 1906 to 1910 inclusive was 28,063,000 barrels.

In Northumberland the orchards are confined to a narrow strip along the shore of Lake Ontario, and are chiefly in the eastern end.

ALNWICK



SOUTH MONAGHAN



The following table shows the number of trees and acres of orchard which were actually visited for the different townships and for the county:

TABLE 18.

Townships.	Bearing.		Non-bearing.		Total acreage.	Total No. of trees.
	Trees.	Acres.	Trees.	Acres.		
Hamilton	27,840	575	26,768	555	1,130	54,608
Haldimand	31,796	618	29,939	611	1,229	61,735
Cramahe	47,021	955	35,246	786	1,741	82,267
Brighton	38,255	849	34,035	727	1,576	72,290
Murray	49,480	977	49,090	1,034	2,011	98,570
Seymour	1,900	35	.....	.....	36	1,900
Percy	7,805	168	5,100	109	277	12,905
Alnwick	1,095	22	.....	.....	22	1,095
Monaghan		(No orchards visited because of lack of time.)				
Totals	205,192	4,199	180,178	3,822	8,021	385,370

ORCHARD SURVEY OF NORTHUMBERLAND COUNTY.—PART II.

P. E. FRENCH.

INSECTS AND DISEASES.

Diseases and insect pests have, in many instances, done so much damage that they afford a great source of discouragement to many fruit growers. This county is probably as well endowed with those pests attacking the apple, as most counties in the Province. The one very serious insect pest, which is not prevalent here, is the San Jose scale, and it is to be hoped that it will not get a foothold in this part of the Province. It is claimed that the scale cannot survive the cold winters in this section, but the writer found a few of the living insects on five or six trees, in a young orchard which had been out two winters. The nursery stock seemed to be the only source of infestation. The scales had not multiplied very rapidly, so that probably the cold winter had some effect on them. However, there is a possibility that this insect pest might do considerable damage, if allowed to enter, so it is advisable to take every precaution to keep it out.

In the unsprayed orchards, the oyster-shell scale has done a large amount of damage all through the country. It is claimed by many growers that this pest is not nearly as bad now as formerly, but many orchards were found this year, containing trees with the bark simply covered with the young, live insects.

The apple canker is very destructive in all parts of the district covered by this survey. Many limbs, and in some cases, whole trees are dying. In many cases it has gained an entrance into the bark through injury caused by sun-scald. This is especially true with the high-headed trees, or those with an open habit of growth. Quite often it gains an entrance into the trunk through injury done by the single-tree.

The codling worm, apple scab, and plum curculio, are doing the most damage to the fruit.

The railroad worm or apple maggot was seen in two or three orchards near Smithfield.

Blister mite was very bad this year in the unsprayed orchards.

A Cankered Apple Tree.

The same tree later in the season.

The bud moth, cigar and pistol-case bearers, were bad, especially on the young orchards.

The American tent caterpillar, apple aphis, yellow-necked and red-humped caterpillars, fall web worm, canker worm, were quite common in most sections, and doing considerabe damage.

Collar rot is quite prevalent in some sections.

Spraying. Spraying has been carried on regularly and systematically in very few sections of Northumberland County. A few of the more progressive fruit growers are becoming convinced that to grow fruit of high quality, they must combat the insect pests and fungous diseases. Throughout the county there is a very marked lack of intelligent knowledge of spraying and spray mixtures, and of the insect pests and fungous diseases affecting the orchard.

Only a comparatively small number of the growers in this county, who are practising spraying, are doing it with sufficient thoroughness. Too many forget that one spraying, done at the proper time, does much more good than two or three sprayings done at other times. Many are still of the opinion that it does not pay to spray, yet most of these men realize that they will soon have to do something.

Only 30 per cent. of the fruit growers of Northumberland County, sprayed in 1909. Of these 3 per cent. sprayed three times, 44 per cent. sprayed twice, and 53 per cent. sprayed once.

Bordeaux Mixture and Lime Sulphur Wash are the two principal spray mixtures used. Formerly the Bordeaux was used almost entirely, but the Lime and Sulphur has been replacing it the last two years. Most of the growers who are using the Lime and Sulphur Wash are using the commercial brands.

In spite of the poor spraying practice so general in the district, the following tables give conclusive evidence that it pays. In compiling these tables there were used, for comparison, well cultivated and fertilized orchards in every case. Very few of the sprayed orchards were sprayed more than twice, and the cost of spraying did not average more than $5 or $6 per acre.

The income given per acre is the amount realized on the tree in each case, the cost of picking, packing and packages, being deducted in those cases where the gross returns were given.

Table 1.—General Results from Spraying.

Average per acre.	1907.		1908.		1909.		Aver. yield in bbls. for 3 years.	Aver. income per acre for 3 yrs.
	Bbls.	$ c.	Bbls.	$ c.	Bbls.	$ c.		$ c.
50 Cultivated, fertilized and sprayed.—486 acres.....	75.	92 15	43.3	58 80	47.	68 10	55.1	73.00
68 Cultivated, fertilized and not sprayed.—344 acres..	52.7	55 60	32.	37 15	38.1	42 75	40.9	45.16

Table 2.—The Fifteen Best Sprayed Orchards Compared with the Fifteen Best Unsprayed Orchards.

Average per acre.	1907.		1908.		1909.		3 years aver. yield in bbls.	3 years aver. income per acre.
	Bbls.	$ c.	Bbls.	$ c.	Bbls.	$ c.		$ c.
15 Cultivated, fertilized and sprayed.—116 acres.....	111.7	150 10	65.6	94 20	82.3	131 00	86.5	125 10
15 Cultivated, fertilized and not sprayed.—63 acres....	87.4	101 55	52.6	62 70	62.	79 80	67.3	81 35

Table 1 shows that over a period of three years, the 50 sprayed orchards gave an annual average income of $27.84 per acre more than the 68 non-sprayed orchards.

In Table 2, the orchards were all well cultivated and fertilized. This table shows the value of spraying much more accurately than table No. 1, because in these sprayed orchards the spraying was fairly carefully done, while in many orchards used in table No. 1 the spraying was not done intelligently.

Table No. 2 shows that the fifteen best sprayed orchards, for which figures were obtained, over a period of three years, gave an annual average income of $43.75 per acre, more than the fifteen best unsprayed orchards.

TABLE 3.—SELLING PRICE OF SPRAYED AND UNSPRAYED FRUIT.

——	1907	1908	1909	No. of orchards.
	$ c.	$ c.	$ c.	
Sprayed	1 23	1 35	1 45	50
Not sprayed	1 05	1 16	1 12	68

This table represents the prices paid per barrel on the tree, for apples from sprayed and unsprayed orchards. It shows that the fruit from the sprayed orchards brought 23 1-3 cents more per barrel on the average than the fruit from the unsprayed orchards. Note also that the difference in the price paid for sprayed and unsprayed fruit is gradually becoming greater each year.

Every apple and pear orchard should be sprayed three times each year as follows:

(1) Shortly before, or as the leaf buds are bursting. Use lime-sulphur, either commercial or home-made, corresponding to the strength of the commercial diluted one gallon to ten gallons with water. No poison is necessary. This application kills San José Scale, Oyster-shell Scale and Blister Mite, and helps ward off cankers, and apple and pear scab.

(2) Just before the blossoms burst, use commercial lime-sulphur diluted one to thirty or thirty-five, or Bordeaux Mixture (4.4.40) and two lbs. arsenate of lead to each forty gallons. This application is to destroy all early feeding caterpillars, such as Tent Caterpillars, Case-Bearers, Canker Worms, and Bud Moths, and to help against apple and pear scab and cankers.

(3) Immediately after the blossoms fall, use the same mixtures as for No. 2, but the lime-sulphur need not be stronger than one to forty, nor the Bordeaux than (3.3.40). This application is chiefly to control Codling Moth and Apple and Pear Scab, but also helps greatly against Lesser Apple Worm and Plum Curculio.

A fourth application may be given about three weeks after the blossoms fall, with the same mixture as in No. 3, but this is seldom necessary in Northumberland County.

HEADING AND PRUNING. The method of heading and pruning practised by the fruit growers of Northumberland County is probably one of the first things which should be improved. The majority of growers prefer a very high headed tree, and in most cases all the pruning that is done to the young tree is the cutting off of the lower branches.

By getting the tree young from the nursery, say one or two years old, and pruning regularly from the time of planting, one can shape and grow the tree to his own liking. Many of the best growers now prefer a low-headed tree. The advantages of low-headed trees may be stated to be, great ease in picking, thinning, pruning and spraying, and less damage to trees and fruit from winds. The low-headed tree is also more free from sun scald. Many young trees have died because of the long trunk exposed to the sun. They become sun-scalded on the south-west side and this gives an entrance for canker.

Many growers object to low-headed trees because of greater difficulty in cultivating around them. Properly trained low-headed trees will develop ascending branches, so that the difficulty in cultivation is not what one would expect at first thought. The branches on the high-headed tree will often tend to grow downward, as there is as much light underneath as above; thus there is very little difference in the actual cost of cultivation, and there is a great deal saved in the picking, thinning, pruning and spraying of low-headed orchards.

Many of the fruit growers in this county do very little pruning until the tree is of bearing age. This generally results in having a large number of main branches. Then to get the tree fairly open the pruner cuts off nearly all the smaller branches on the lower part of the main limbs. This results in the fruit being borne on the ends of the main limbs; thus, all the weight is on the outer end, and the branches very often break. It is also more difficult to harvest the crop.

In some cases the grower, on finding that his old trees have too thick a top, has pruned all the centre out at once. This sudden opening of the centre has caused sun-scald and canker has entered with the resultant injury or death of the branches.

Much of the pruning done at present is simply the cutting out of dead wood and suckers. Undoubtedly these should be cut out regularly, but it is a great mistake to think that this is the only pruning necessary.

There are two seasons at which trees are generally pruned, in early spring when the trees are dormant, and in the summer shortly before the season of growth ends. One must become familiar with the fruiting habits of his trees before he is in a position to say which is the better time, as the spring pruning tends to make wood growth, while summer pruning tends to force the fruit buds.

A large number of the orchardists in Northumberland County prefer June pruning and do not do any in the spring. Quite often many of these men have not time to get over nearly all the orchard in June, and thus much of it is left undone. It would be much better for these growers to do their pruning early, so that it would be completed before the busy season.

Many growers claimed that they pruned "whenever the knife was sharp." The greatest trouble with this method seemed to be that the knife was not very often "sharp." It is a very good practice to cut out the small unnecessary branches at any time, but one should have a regular time to go over the whole orchard. Early spring is probably the best time to prune non-bearing trees. Older trees of a heavy bearing habit should also be pruned in early spring, while those of a very light bearing habit should be summer pruned.

THINNING. The practice of thinning apples is practically unknown among the fruit growers of Northumberland County. The writer found only two growers in the county who were practicing it, and these were doing it on only a very small scale. Many of the growers think that it does not pay to thin; others claim that

they can do all the thinning required by pruning. To a certain extent pruning is a method of thinning, but it will not take the place of thinning entirely. Experienced orchardists have found that it pays to thin and pays well. They place the cost of thinning apples at five cents per barrel.

Thinning not only increases the percentage of first-class fruit without lessening the bulk, but also encourages more regular bearing; lessens the loss from the breaking of limbs, and gives the grower an opportunity to destroy insect-infested fruit, and thus check the spread of insects early in the season. The thinned tree does not need all its stored up material for the formation of fruit, and thus it is able to form fruit buds for the next year, so that we are more apt to get annual crops.

The time is coming when fruit growers will be unable to produce strictly first-class fruit without thinning.

A low-headed well formed apple tree.

Harvesting. The manner of harvesting depends on the manner of sale. When the fruit is sold on the tree, the harvesting is done by a gang of pickers in the employ of the buyer. Nearly all the early fruit and a large quantity of late fruit is packed in the orchard. Some is picked and put in barrels as tree-run and placed in storage houses, where it is later repacked. The buyers generally require a large number of men to harvest the apple crop in this county.

In a few instances the growers are either picking and packing their own fruit, or picking and selling tree-run in barrels, the buyer doing the packing. Those who are doing this seem to be getting very good results. When growers are doing their own picking they are careful in handling the trees. In many cases where the picking has been done by the buyers gang, considerable damage has been done to the trees through rough usage of the branches.

If the grower has sufficient labor, he is usually in a better position to pick the fruit at the proper time, and can do it at less expense than the buyer. It has been

proven that where the grower is picking and packing his own fruit properly, it is more advantageous to him, and more satisfactory to the buyer.

Storing. The storing of the apple crop in this county is done mainly by the buyer, who generally has a storage warehouse near the railroad. These men usually ship as much as possible in the fall.

The keeping quality of both the early and late fruit is improved by storing in a cool warehouse for at least a few days before packing for shipment. In this way the fruit is cool to a constant temperature before the final packing. On account of this pre-cooling the fruit is not apt to shrink and become loose in the barrels on the voyage.

If there were a few cold storage plants in the county it would aid considerably in the storing of the apple crop and in putting it on the market in better condition. The only cold storage plant in the district is at Trenton.

Selling. The methods of selling in Northumberland County are:—

(1) To the apple buyer, either by bulk or by barrel on the tree.
(2) To the buyer, packed or tree-run, in barrels.
(3) Shipping direct to wholesalers at the point of consumption.
(4) Through co-operative associations.

The first method is the one usually adopted. In the last three years about eighty per cent. of the apple growers have sold this way. This year the apple buyers started out to buy as early as July 12th, when the fruit was only one-half grown. This method of sale has many disadvantages. It is simply a gamble with the buyer having a little better chance of coming out on the right side, as he is generally better informed about the markets and prices and is usually a better judge of the amount on the trees than is the grower. Quite often it places the grower in a position where he has to take what they will give, while he should have some say in naming the price. Keen competition among the buyers often causes a flat rate to be paid. This is detrimental to the grower who is producing a good class of fruit, as he does not, in many cases, get any more per barrel than the man who is growing a poor quality of fruit. Thus there is very little encouragement to grow a good quality of fruit.

If the buyer has bought by bulk on the tree and the price in the fall is not what he had expected, there is a danger that he will put in as many of the inferior apples as possible, and thus the industry suffers. On the other hand, if the crop is sold by the barrel on the tree, the grower sometimes suffers from not having the fruit picked in time, and thus considerable is lost on the ground. The buyer usually picks those he has bought by bulk first, and sometimes, if he has very much on his hands, those bought by the barrel are neglected. Often the grower expects the buyer to take everything, so that there is generally dissatisfaction one way or the other. Sometimes the fruit goes through the hands of several buyers before reaching the consumer. This naturally takes much of the profit which should rightly belong to the grower.

This method of selling certainly has many objections, some of which have been mentioned above. However, all the trouble does not lie with the apple buyers. It is more in the system itself. Many of these men are doing a great deal for the industry, and honestly doing their best under the circumstances.

Table 4 shows that the prices received under this method of sale are very low:

TABLE 4.—DIFFERENT METHODS OF SELLING, 1909.

——	Total Bbls.	Total $.	Aver. price paid per Bbl.	Total No. orchards.
			$ c.	
Sold on tree to buyers	74,344	82,614 30	1 11	391
Sold packed, or tree run in barrels	9,081	14,151 20	1 55	35
Shipped individually	10,505	17,105 65	1 62	27
Sold through Co-operative Association	7,632	10,953 20	1 43	28

The second method of sale, *i.e.*, selling to the buyer packed or tree-run in barrels, is probably one of the best methods for the ordinary fruit grower where there is no good co-operative association. About 7 per cent. of the growers in this county sold by this method last year, and they realized on the average forty-four cents per barrel more than those who sold on the tree. If the grower will put up a good sample of fruit he generally makes more out of it, and, at the same time, the buyer is well satisfied. Many of the buyers would sooner buy this way, if the growers would pack and grade their fruit properly. The objection to this method of selling is that it is practically impossible to get a uniform pack in those places where the grower is packing his own fruit. In the case where the buyer is doing the packing this objection does not hold good.

Third Method: In looking over Table 4 we see that in 1909 this method of selling netted the most per barrel on the average. At the present time only about 7 per cent. of the growers ship independently. It is one of the best methods of sale, where the grower has a large quantity of fruit, and enough capital to tide him over a bad year. Under the present conditions it is very difficult for the small producer to make a success of it.

Fourth Method, *i.e.*, Through Co-operative Associations: The associations idea is not thoroughly established in this county, there being only about 6 per cent. of the growers who sold through co-operative associations in 1909. There are at present three of these associations in the county, viz.: The Grafton Fruit Growers' Association, Grafton, Ontario; The Cobourg Fruit Growers' Association, Cobourg, Ontario; and the Canadian Apple Exporters, Limited, Trenton, Ontario. The first two of these have only been running one year, so that it is hardly fair to compare their prices with those received by the shippers who have been in business for some time. However, the table shows that the price realized by the growers in these associations, although they have been running such a short time, is 32 cents per barrel more than the price realized by those who sold on the tree direct to the buyer. This is certainly a good start.

It is true that the men who shipped independently last year realized a higher price than those who shipped through the associations, but we must remember that those men are only a small percentage of the total number of growers, mainly men of exceptional business ability who produce and command large quantities. The small growers found that they were at the mercy of the commission men in the Old Country, and that there was little chance of success, so they have stopped shipping individually.

The advantage of co-operative associations may be summed up as follows: It turns the middleman's profits to the producer; sales can be made more directly to the consumer than can be done through the ordinary buyer. It brings the cost

of handling to the lowest possible rate. It induces better railroad, steamship, and other accommodations because the handling of several hundred cars is an item worth competing for. It gives a more even distribution of fruit, because the manager has a large amount under his control.

Supplies of various kinds used on fruit farms can often be bought in large quantities, so that the prices to the grower are only slightly in excess of the actual cost. This is an advantage particularly in such items as spray and box, or barrel material.

Associations are successful in maintaining a uniform pack, and by this means they establish a reputation for their goods. Their brand should be a guarantee for the quality. This securing of a uniform pack is one of the strongest points in favor of an association. It brings better prices. The most rigid grading should be practised, and the best grade will command the price that it deserves. This is a source of encouragement to the grower of good fruit.

Some of the causes of failure are:—

(1) A wrong start. An association should not start on too large a scale. It is impossible to get a large amount of evenly graded fruit the first year. It is much the best way to start on a small scale and gradually work up a reputation and a market for your fruit. Strict rules regarding spraying and grading should be enforced from the start. Otherwise the manager is sure to be called on to sell a large quantity of inferior fruit. This means low prices and dissatisfaction.

(2) Petty jealousies and distrust on the part of the members.

(3) Employment of Management. Men who are capable of handling large quantities of fruit at a good profit are not common, and when one is found every effort should be made to retain him. He should have a salary in proportion to the amount of business and responsibility that must be carried. The manager should be given a fair chance to work out his own ideas, and then if he fails try another.

(4) Too much supervision by the directors and unjust criticism and fault-finding on the part of the members is often the cause of failure.

There should be uniformity in the organization of different associations, so that they can work together in cases where just joint action would be desirable.

Evaporators. Northumberland County is very well supplied with evaporators. Nearly every township has one or two, and these pay from twenty-five to forty cents per cwt. for the apples. They offer an easy market for the wind-falls, etc. No orchards were observed in this survey where the total crop was disposed of to the evaporator.

Canneries. There are three canneries in the district, at Lakeport, Brighton and Trenton. They do quite a large business in tomatoes, corn and peas, and a small amount in apples and strawberries.

Yields, Prices and Profits. In the various tables given the yields and prices received from the various methods of handling orchards and selling the apples are shown. These results are now brought under one head in the following table:

TABLE 5.—YIELDS AND PRICES.

Average per acre.	1907.		1908.		1909.		Aver. yield in Bbls. for 3 years.	Aver. income per acre for 3 years.	Aver. prices per Bbl. for 3 yrs.
	Bbls.	$ c.	Bbls.	$ c.	Bbls.	$ c.		$ c.	$ c.
Cultivated, fertilized and sprayed. (Best fifteen). 116 acres	111.7	150 10	65.6	94 20	82.3	131 00	86.5	125 10	1 45
Cultivated, fertilized and not sprayed. (Best fifteen)—63 acres	87.4	101 55	52.6	62 70	62.	79 80	67.3	81 35	1 20
50 Cultivated, fertilized and sprayed.—486 acres	75.	92 15	43.3	58 80	47.	68 10	55.1	73 00	1 32
68 Cultivated, fertilized and not sprayed.—344 acres	52.7	55 60	32.	37 15	38.1	42 75	40.9	45 16	1 10
69 Cropped.—344 acres	46.3	47 20	25.6	31 15	35.8	39 45	35.9	39 25	1 09
9 Sod.—188	41.6	43 60	33.	30 60	39.2	42 28	37.9	38 82	1 02

NOTE.—The incomes per acre and prices per barrel are in every case the value on the tree. In the case of the sod and cropped orchards there was very little spraying done, so that it was not taken into account.

The figures in Table 5 show very plainly the yields and prices received by the Northumberland County fruit growers. Not only do proper methods of management give increased yields, but it it is quite evident from the figures in this table that they also materially increase the price per barrel.

TRANSPORTATION FACILITIES. Th southern part of this county is very well supplied with transportation facilities. The Grand Trunk Railway affords means of transport either east or west. The boats on Lake Ontario carry what is shipped to the United States.

The Canadian Northern Railway, which is now under construction, will probably be in working order by next year. As a result of this competition the railroads will probably be more desirous of giving good service than they are at present.

In the northern part of the county the growers have a long distance to haul the crops, and as apples are a heavy product, this takes off much of the profit. The roads are very hilly, so that it is impossible to take very much at a time.

If there was more fruit grown along Rice Lake it could easily be handled by boat to Peterboro. This is not done to any extent at present, but the writer does not see any reason why it could not be done if there was a large enough quantity grown.

MARKETS. Up to the present time the market has been mostly in Europe. Most of the apples go to Liverpool and Glasgow, and are sold through the "Receivers" there. A small amount is shipped to the West, but this is a very small portion of the total apple crop. Many of the shippers claim that the freight rates to the West eat up all the profits. During the last season a few men have shipped to the United States and report fair results.

The pears grown in this locality are consumed locally.

Cherries and raspberries are not grown to any extent. The local market takes all that are grown.

Strawberries are grown in small quantities in a few sections of the county. These are sold on the local market or sent to the cannery.

Population. It is hard to acknowledge that the "Banner Apple County of Ontario" is steadily decreasing in population. Nevertheless, this is true, as the following figures prove. The present population is only 80 per cent. of the population in 1881. This decrease is due mostly to the westward movement. In the better fruit sections of the county we find that the population is not decreasing as rapidly as it is in those sections where the people go in more for mixed farmings, and Northumberland County is not decreasing as rapidly as some of the other counties in Ontario.

The following table shows that there has been a gradual decrease in every township. The town of Cobourg decreased from 1881 to 1901, but has increased the last ten years. This is probably due to it having grown in favor as a summer resort. The increase in the case of Campbellford is due to the construction work on the Trent Canal.

Table 6.—Population of Northumberland County.

——	1881	1891	1901	1909	Increase.	Decrease.
Townships:						
Hamilton	5,155	4,313	3,623	3,495	.....	1,660
Haldimand	5,401	4,484	3,946	3,484	.....	1,917
Cramahe	3,481	2,995	2,556	2,434	.....	1,047
Brighton	3,470	3,017	2,774	2,101	.....	1,369
Murray	3,560	3,303	2,993	2,558	.....	1,002
Seymour	3,783	3,509	3,261	2,675	.....	1,108
Percy	3,768	3,388	3,216	2,690	.....	1,078
Alnwick	1,471	1,321	1,247	872	.....	599
South Monaghan	1,148	1,093	929	869	.....	279
Town:						
Cobourg	4,957	4,829	4,239	5,265	308	.....
Villages:						
Colborne	1,079	1,068	1,017	955	.....	124
Brighton	1,547	1,479	1,378	1,375	.....	172
Campbellford	1,418	2,424	2,485	2,818	1,400	.....
Hastings	885	812	815	775	.....	110
Total	41,123	38,035	34,479	32,366	1,708	10,465

Net decrease, 8,757, from 1881 to 1909.

Labor Conditions. The scarcity of labor is one of the first difficulties which confronts the fruit growers of this county. Many men of the laboring class have gone West or to the city, and the railroad construction, which is now being pushed forward, is using many of those at present in the county. The farmers themselves are somewhat to blame for the scarcity of labor. It is true that the widespread stories of the easily made money in the West, have enticed many away, but if the conditions of the laboring men on the farm were better, probably many of these men would have remained in the East. Most of the farmers expect the men to work very long hours for a wage which is much below that paid in other lines of business. Many of the farmers with one hundred acres of land are doing practically all the work themselves. They would rather neglect the work than pay more than $25 and board per month. The more progressive fruit growers, however, find that it pays them to give good wages and treat their men well. The men who are doing this seem to have very little trouble in getting men. The farmers,

as a rule, are getting a higher price for their produce than formerly, and should be able to pay a higher wage.

Land Values. Land values vary considerably in different sections of the county. The proximity to transportation facilities is probably the largest factor in deciding the value. Along the Kingston Road an ordinary farm with good buildings would sell for $60 to $100 per acre, while three or four miles back, good farms can be had for $30 to $80 per acre. Land suitable for fruit growing at such prices is very reasonable.

The following table gives values and areas of the nine townships of Northumberland County:

Table 7.

Townships.	Area in acres.		Assessment value.	
	Total.	Cleared land.	Average per acre.	Total land.
			$ c.	$
Hamilton	62,280	57,945	21 77	1,356,465
Haldimand	76,355	62,062	13 98	1,067,570
Cramahe	46,470	38,893	16 85	783,265
Brighton	48,100	36,693	17 82	857,090
Murray	48,593	35,758	16 59	806,200
Seymour	67,292	44,076	11 78	792,925
Percy	51,417	36,194	14 69	755,475
Alnwick	17,754	13,600	14 11	250,580
South Monaghan	18,088	14,438	28 23	510,675
Totals	436,349	339,659	16 45	7,180 245

Development and Possibilities. It is only within the last forty or fifty years that the fruit industry has developed in Northumberland County. About 1860 a few commercial orchards were planted, but none of these were very large. In most instances these orchards were neglected, and did not prove very profitable. For the next twenty years there was very little commercial planting done, most of the farmers simply planting an acre or two for home use. In nearly every case the trees were placed too close together, twenty or twenty-five feet square being the average. These orchards, like the former ones, were neglected. Practically no pruning was done and the farmer seemed satisfied with an occasional plowing and manuring. In the early nineties there was a boom in the apple industry, and many commercial orchards were planted. Better orchard practices were more common and the orchards were put more on a paying basis. Still there were very few that were given extra good care.

It is only within the last ten years that the industry has received its greatest boom. About one-half of the trees now growing have been planted within this period. The good prices and fair crops have made, not only the farmers, but men in other lines of business, interested in fruit growing. Young orchards are now being planted out all over the county.

The possibilities of Northumberland County as an apple-growing section can scarcely be exaggerated, if the fruit growers as a whole will wake up to the fact, that to grow fruit most successfully they must take the very best care of their orchards. Some are doing this, but the percentage is very small. One man told the writer that when he had to thin, spray and prune his orchard to get good apples he would go out of the business. The sooner such men get out of the busi-

ness, the better for the apple industry. It is the men who are thinning, pruning and spraying along with good cultivation and fertilizing that are making the most money out of the business and are upholding the reputation of the county as an apple producing section.

In some sections drainage is essential to the best development of the industry, but this applies to a small portion, mainly along the lake front and the western part. Much of the best orchard land is on high ground with a good porous subsoil.

Peach and sweet cherry culture will probably never be a paying business to any extent in this county, as the winter is rather severe for these more tender fruits.

Sour cherries are not grown in very large quantities, but what were noticed in this survey seemed to be doing very well indeed, and there is no reason why a sour cherry orchard should not be a paying proposition. There is a good market for them in Montreal and Toronto.

A crop of hay and a crop of apples.

The few strawberry beds visited were doing exceptionally well, and this industry should be encouraged.

The greatest opportunity in the fruit line in Northumberland County is undoubtedly in the apple business. The writer sees no reason why this county should not be able to grow as good apples of the hardier varieties, as any section in the Province, if the growers would improve their methods. Nature has done her part and done it well. Here we have a rich soil, good climate, fine roads good transportation facilities, unlimited markets and in the near future, Northumberland County bids fair to become one of the chief apple producing sections of Canada.

ORCHARD SURVEY OF THE EASTERN TOWNSHIPS OF THE NIAGARA DISTRICT.

F. M. Clement and V. King.

Orchard survey work was taken up first in the summer of 1909 by the Ontario Department of Agriculture and the Ontario Agricultural College, with the intention of collecting definite information with regard to the Horticultural situation in different sections of the Province. The field work in the Niagara district was started by W. D. Jackson, B.S.A., in June of that year, who worked in the townships of Barton, Saltfleet, and Grimsby. This year, 1910, the work was continued and completed by the writers in the four townships, East Clinton, South Grantham, and Niagara, and is intended to supplement the work of the previous year.

The plan employed was that of a farm-to-farm canvass with specially prepared blank forms on which were noted the owner's name and address, location and size of the farm, and the number of acres in fruit. If the grower was making a specialty of more than one kind of fruit, he was questioned on each with regard to acreage, bearing and non-bearing, the age of the trees and the distances of planting, and the soil on which it was growing, with the depth and drainage. Special attention was paid to methods of cultivation, to the cover crops and fertilizers used; pruning, thinning, spraying, with the kind of mixture used and the results obtained; insect pests and fungus diseases, and the manner of selling were also given careful attention. Also, where possible, yields and prices were obtained, and in every case the writers went over the farms and noted their condition. This plan differed from that of the previous year only in that a separate blank was used for each fruit, where formerly a general blank was used. The change was a decided improvement.

Situation. The situation of the Niagara Peninsula is ideal for tender fruits. Lake Ontario extends westward about forty-four miles farther than the farthest point eastward of Lake Erie. This point is connected with Lake Ontario by the Niagara River, which flows due north, forming a strip of land three sides of which are bordered by water. At no point is this more than thirty miles wide. The highest contour, about nine hundred feet, is reached midway between the two lakes, and the slope being gradual each way never are the variations in temperature so extreme as in most other sections in the same latitude. But the Niagara district proper is not so extensive. The Niagara escarpment or mountain extends from Hamilton to Queenston. This is an abrupt rise of from seventy-five to one hundred feet. At Hamilton it extends back in varying distances until it reaches the extreme of seven miles at Queenston. The country lying between Lake Ontario and the escarpment includes the whole of the survey and is the Niagara district proper. The whole section slopes gently to the north, which gives it a free circulation of air and consequently frost injury is less extensive than in many parts of the tender fruit districts of the Province.

Contour. Lake Ontario is two hundred and forty-six feet above sea level. The two hundred and seventy-five foot contour follows the lake in varying distances from the shore, ranging from one-half mile at Beamsville to one and one-half miles at Niagara. The three hundred and fifty foot contour, however, follows very closely the Queenston Hamilton Stone Road, and may be said to mark the bottom of the first ledge of the escarpment. The four hundred foot contour is still farther

from the shore, and marks the beginning of the abrupt rise of one hundred feet or more—the Niagara escarpment. This rise might appropriately be called the Ten Million Dollar Ridge, as it makes possible the production of the tenderer fruits. Again the rise is gradual until the highest point is reached near Fonthill, from which the waters of both Lakes Erie and Ontario are visible. But we are concerned with only the section below the escarpment. Thus the district surveyed is divided into two parts, the somewhat level though gradual sloping northward section bordering on the shore, and the somewhat rolling clay loam section of the first ledge.

Climatic Variations. The extremes of temperature vary a little even on this area. The greater the distance from the shore, the less influence the water has. A number of residents claim that the temperature varies as much as one degree for each half mile for the first mile and one-half from the shore, with a gradually diminishing variation as the distance increases. That is, on a given day in winter, especially when it is very calm, it is often times three degrees colder one mile and a half from the shore than right at the shore, with even a little lower temperature two, three, and four miles from the shore. Just the opposite is true in summer, the inland districts then being warmer. The following tends to bear out these statements. The first Yellow St. John peaches were picked this year at Queenston, seven miles from the lake, on August the twenty-second; while in Louth, two miles from the shore, the first were picked on August the twenty-sixth, four days later; while again on the shore in Niagara Township the first were not picked until September the first, or more than a week after the earliest. The orchards were all in a good state of cultivation, and the fruit in the same stage of maturity as nearly as could be judged by the writer.

Soils. We shall not here concern ourselves with geological details of the soil formation, except to state that evidence points to the fact that at one time the whole district was lake bottom and that the soil was deposited as the water receded. The surface soil and the subsoil as we find them to-day are of more interest, and we shall classify them according to what they are best fitted to produce, rather than according to their composition.

As a general rule, the soil along the shore is of a sandy and loamy nature, but varies sometimes to the greatest extremes even on a few acres. This sand extends backs from the lake shore from one to two miles and sometimes more. Along the Niagara River is another strip of sand extending from the river bank westward about one mile and a half. It must be remembered that this is only a rough outline, because often times narrow strips of clay extend to the water's edge and sand knolls crop out at various places in the heavy clays.

The first ledge and some parts along the banks of the streams are of a clay loam nature. As a rule this is easily drained and will, when sand is no longer as cheap as it is to-day, be more largely used for peach culture than it is at present. As it lies to-day, it is well suited to grapes, plums, pears and apples.

The central portions of the townships, especially farthest east, are of a clay or heavy black loam nature, with many variations. Except near streams this is difficult of drainage, because of the too gradual slope of the country. The largest areas of this soil are found in Grantham and Niagara. The subsoil is heavy and comparatively impervious to water. However, it is excellent grape soil and is giving some of the highest yields of the best quality fruit. Plums, pears, and apples do fairly well on it also.

The following table gives a fair estimate of the areas of the different soils surveyed, classified as above.

Township.	Sand soil easily or naturally drained.	Clay loam, easily drained.	Clay, black loam, etc., with heavy subsoil.
Clinton	4,160	1,600	4,480
Louth	6,800	2,880	3,360
Grantham	7,600	5,320	5,280
Niagara	8,280	2,920	7,280
Total	26.840	12,720	20.400

Thrifty nursery stock in the Niagara District.

History. The peach and grape history of the Peninsula extends back more than fifty years, but neither industry was carried on, on a large commercial basis, until between 1885 and 1890.

Before 1880 the graperies were few and very scattered, but with the introduction of the Niagara at that time a new stimulus was given to the industry. Vines of this variety sold as high as $1.25 each, and the grower was obliged to return all cuttings to the nursery, but prices were very high and single vines often yielded as much as two or three dollars' worth of fruit. In 1880 there were about four hundred acres of grapes, but in 1890 the acreage had grown to more than two

thousand acres. By 1901 the acreage had increased to 5,750, and to-day we have more than 10,000 acres under this crop, with prospects of a very steady increase for a number of years.

The peach industry began with the introduction of natural fruit planted between the rows of apple trees, along the fences, or in the door yards. The first record of commercial planting that we have is from Mr. Dennis Woolverton, of Grimsby, who sold them in Hamilton market about the year 1820. In 1856 Mr. C. E. Woolverton, of Grimsby, planted the first large commercial orchard that we have any record of, five acres of such varieties as Barnard, Crawford, Oldmixon, and Mountain Rose. Mr. Woolverton was the first also to ship by express to different Ontario markets. From 1890 to 1898 the industry boomed and fell. Many growers did not understand peach culture, which resulted in a large quantity of poor grade fruit being thrown on the market. In many cases the fruit did not pay the express charges. Then came a very severe winter in 1897-98, and many trees were killed. This forced many out of business and discouraged others who then refused to replant. But the best men stuck to it and others came back slowly.

In 1904, the first shipment was made, by frieght, to Winnipeg, and since that time, though plantings have increased largely, at no time has the market been over supplied. Several hundred cars were forwarded to the West this year. The first shipments were made to Europe in 1909 and were entirely successful. This year, 1910, several thousand cases were forwarded, and though the work is still in the experimental stage, it is expected that it is possible to develop there a large and profitable market.

Also this year cherries, strawberries, currants, gooseberries, and a few raspberries were sent to the West. In no case was the experiment discouraging, and it is expected that a large quantity of these fruits will be forwarded next year. The market is there. It is simply a case of being able to land the goods in first-class condition.

The Situation with Regard to Each Class of Fruit.

Peaches. Peach production is the leading industry of the Peninsula, and it is increasing much more rapidly than any other. The plantings in the spring of 1907 and 1908 were exceptionally heavy. The plantings of 1909 and 1910 were heavy also, but owing to the scarcity of nursery stock were somewhat lighter than the two previous years. The following table shows the trees bearing and the non-bearing by townships. All trees three years old and younger in the spring of 1910 are considered non-bearing.

Township.	Bearing.	Non-bearing.	
Clinton	37,253	66,078	
Louth	57,887	78,867	
Grantham	48,913	69,287	
Niagara	103,564	133,854	
Total	247,617	348,086	4,495 acres

From this it will be noticed that the non-bearing stock is considerably in excess of the bearing stock, which would indicate that in four years' time, or when

the young trees come into bearing, the production will be more than doubled. But before coming to such a conclusion, it might be well to take some other factors into consideration. A very large percentage, perhaps as high as twenty-five per cent. of the trees never produce a fruit that goes on the market, and there is another large percentage, perhaps as large as the above, that produces only second grade fruit. There are several reasons for this: (1) A great many are neglecting the cultivation, spraying, etc., of their trees; (2) Fungous diseases, insect pests, etc., claim many of them: (3) Little Peach and Yellows have to be reckoned with; (4) Many are planted on speculation, to sell the place, on soil too wet and heavy to produce in quantity; (5) Many trees now counted as bearing have passed their day of usefulness and will soon have to be removed.

It must be remembered, too, that our markets are expanding rapidly, and that up to date we have not kept pace with this expansion in the production of fruit of first quality. A large number of growers, some buyers and companies are supplying the high-class trade and getting good returns. But even to-day and in the last few years when prices have been good some claim that their fruit has not paid them. And both classes of producers are likely to continue. The one with good quality goods will get good returns, while the other will handle his at a loss. the market is calling for the former, but it is overstocked with the latter.

GRAPES. The grape industry is making steady, gradual growth. The prices received are only fair, but they are sufficiently remunerative to induce growers to keep pace with the gradual extension of market. Following are the figures for the surveyed area. Two years and under in 1910 are considered non-bearing.

Township.	Bearing.	Non-bearing.
Clinton	147,241	22,714
Louth	255,215	54,280
Grantham	296,497	53,547
Niagara	220,606	31,012
Total	919,559	161,553

The figures do not by any means indicate excessive planting. There are a number of reasons for this, the principal of which are: (1) Peach growing offers greater remuneration; (2) Because of random distribution, the price for the past two seasons has been comparatively low. (3) The heavy cost of setting, posting, and wiring the young plantation. (4) Grapes are a staple article and there is less speculation in their production.

There are still, however, many acres of excellent soil which would give better returns in grapes than in the crop it is now producing, whether that crop be hay, grain, pasture, or in some cases peaches. Many on the sand are removing their grapes and planting peaches, so that they can use the soil for the crop for which it is best adapted. The same fact should apply to some orchards on poorly drained, shallow clay and clay loam. This will give an excellent quality of grapes in good quantity, with reasonable care and treatment, while peaches on it must be nursed to get profitable returns.

A private trade is gradually springing up which takes thousands of baskets. The grape juice or sweet wine industry drew from the general trade a large quantity this year. The wineries are taking large quantities each year.

The marketing of poor varieties, such as the Champion, has in times gone past done much to hurt the sale of first-class fruit. Campbell's Early and Moore's Early, fruits of better quality, are, however, gradually taking the place of the above, which is now scarcely planted at all. The habit of cutting the fruit before its season should be discouraged also. Poor, sour fruit is no advertisement for the good fruit that must follow.

The grapery has a place on the average farm that no other fruit can take, unless it be the winter apple. There are many fifty and one hundred acre farms that have on them no fruit at all, grown commercially, on which a grapery of eight or twelve acres would greatly increase the income. At present these farms are used entirely for grain and stock, but demonstration has proved that the soil is admirably adapted to this fruit. Grapes, with good care, produce profitably the third year, and must be considered a first-class investment on land worth from $100 to $150 per acre. They pay good interest on a much heavier investment.

Apples. For a number of years the apple industry has been gradually on the wane. This is due principally to lack of interest coupled with the ravages of the San Jose scale. Before the value of lime-sulphur was fully demonstrated, many orchards were badly weakened. Prejudice seems to have played a large part also. The early experiments, principally those with crude oil and whale oil soap, were not successful, and the feeling grew that scale on an apple tree could not be controlled by spraying. That feeling is not yet fully dispelled, especially in a few sections. Also, until quite recently, the price for apples was very low, while the good price of other fruits, peaches, berries, etc., has attracted all the interest. As a consequence, seventy-five per cent., or perhaps more, of the apple orchards to-day are not paying interest and taxes on the ground on which they stand. The small number of trees of recent planting indicates quite clearly the feeling of the growers as a whole. But still a few are quite optimistic and are planting quite heavily of the fall varieties.

Township.	Bearing.	Non-bearing.	
Clinton	12,574	20	
Louth	12,825	515	
Grantham	10,453	797	
Niagara	13,828	80	
Total	49,680	1,412	1,331 acres

Clinton stands first in quantity and quality of winter apples produced, and in 1908 and 1909 sent out a considerable quantity of box fruit. Louth and Grantham are producing some fruit of fair quality, but it is very limited compared with what is possible from the trees now of bearing age. Niagara, though it has the largest number of trees, is producing practically nothing, scarcely an orchard is receiving even fair attention. Hundreds of trees were cut down and used for fire wood or the manufacture of tool handles during the last few years.

The Jordan Harbor Experiment Station has been an incentive to some in the immediate vicinity to care for their orchards, but the enthusiasm does not seem to have become general. It must be remembered, though, that wherever an orchard of good varieties is being scientifically cared for, it is yielding good returns, demonstrating quite clearly the possibilities of the district. The trend of opinion to-day

is the planting of summer varieties, such as Duchess and Astrachan, for the Western market. The former variety in particular is doing exceptionally well where cared for, and it is very probable that a large acreage will be planted in the next few years.

The best apple orchards are close rivals of the best peach orchards, but generally have been neglected, while the peaches have been nursed.

Plums. All trees that have not borne a fair crop are considered non-bearing.

Township.	Bearing.	Non-bearing.	
Clinton	17,075	7,360	
Louth	12,933	2,775	
Grantham	13,797	5,031	
Niagara	21,841	4,008	577 acres

Plums are not a leading crop in any section, but they have a place and many who are giving them good care and attention are being well repaid for the trouble. Distant markets are taking an increasing quantity each year, and the tendency is to plant certain varieties for this trade.

A large number of orchards are badly neglected and contain many varieties, some of which are unsuited to the present trade. The fancy plums are coming more and more into favor. It cannot be said that plums are over-produced, especially for canning purposes, as some years small quantities are imported from New York State for this purpose.

Pears. Pears, like plums, are, as a whole, a minor consideration, but are usually deserving of a better place. An excellent box trade is being worked up gradually near home as well is in the West. The Bartlett is the leading pear for this purpose, but owing to the ravages of the blight is not being planted extensively. The Duchess is coming slowly into increased favor. The Keiffer is being largely planted for canning purposes. Its good canning and heavy yielding properties make it quite a favorite in spite of its poor quality.

Township.	Bearing.	Non-bearing.	
Clinton	13,352	1,895	
Louth	10,540	5,793	
Grantham	11,263	4,000	
Niagara	18,825	5,478	549 acres

Cherries. It will be noticed that the young trees—those under four years of age—are about two-thirds the number of the bearing trees. This speaks for itself—good prices in the last few years have stimulated planting.

Township.	Bearing.	Non-bearing.
Louth	3,847	4,983
Clinton	4,406	1,941
Grantham	6,313	3,749
Niagara	6,052	3,802

Of this number, the great majority are sour varieties, only a few, 2,726 bearing and 846 non-bearing, being sweet.

It is very difficult to obtain accurate information about cherries for the reason that they are often planted either in the garden or back yard or along the fence. But sweet cherries will stand much heavier planting. Many are experiencing trouble in getting the nursery stock to start. Also, many trees after reaching the age of eight or ten years weaken and die from the top downward. No reason is assigned for this.

The heaviest plantings of sour cherries were made in the springs of 1907 and 1908. These, as a whole, are strong, healthy trees, making vigorous growth. The growers are very optimistic with regard to markets and prices, but express no little concern over the labor for the picking season.

A splendid block of 1 year sour cherries.

Raspberries and Blackberries. Clinton, 97 acres; Louth, 156 acres; Grantham, 184 acres; Niagara, 72 acres; total, 509 acres.

Raspberry culture is of considerable importance in the whole peninsula, but more particularly so in the sections East of Jordan Harbor and Port Dalhousie. They are used much for interplanting and for fillers, especially on the smaller farms where the most intensive methods are practised. Those used as fillers are not taken into account in the above figures. Plantings in the last two years have been very heavy but not excessive, as far as the market is concerned.

Black raspberries are planted only in limited acreage, there being not more than twenty-five acres in the four townships.

Blackberries are of considerable importance in Louth and Niagara, these townships having respectively forty-nine and thirty-one acres. Clinton and Grantham have but a small area not exceeding forty acres between them.

Here, as in the cherry industry, the labor problem in the picking season is the most important factor. The writer believes that the harvesting of those two fruits has almost reached its limit under present labor conditions.

Currants and Gooseberries. Currants are again slowly but surely asserting their right to a place on a fruit farm. Exceptionally high prices have led to increased plantings and the cultivation of the old plantations. They are used largely as a filler and as an intercrop.

Township.	Red.	Black.	Gooseberries.
Clinton	17,130	12,975	4,525
Louth	10,000 (estimated)	10,000	2,850
Grantham	9,095	5,747	4,297
Niagara	9,435	775	3,110
	45,660	29,497	14,782

Gooseberries, too, are gradually winning a place. Demand is increasing very rapidly, but a limited supply of nursery stock has somewhat curtailed the planting. It is at present impossible for the factories to get the required quantity. It is doubtful if the growers, as a whole, understand the requirements of the gooseberry, and as a consequence the returns are not as large as they might be.

Strawberries. Strawberries are a very important crop, especially in the vicinity of Jordan, where conditions are almost ideal for their culture, but in no other section are they considered a leading industry. They are used largely as a

Township.	1910	1911
Clinton	76	65
Louth	183	189
Grantham	98	88
Niagara	41	52
	398	394

filler or intercrop in the young orchard. The demand for early berries is increasing and the price for the first few shipments is always exceptionally high. The price for the midseason and late fruit has been comparatively low the last two years, and the acreage has somewhat fallen off, but now that it has been clearly demonstrated that shipments can be made to the West successfully, it is expected that the acreage will increase and also that better attention will be given to the quality of the fruit.

ORCHARD SURVEY OF THE WESTERN TOWNSHIPS OF THE NIAGARA DISTRICT.

W. D. Jackson, B.S.A.

This work was commenced by the writer on the first of June, 1909, under the direction of the Fruit Branch of the Ontario Department of Agriculture, Toronto, and the Horticultural Department of the Ontario Agricultural College, Guelph, the purpose of the work being to obtain more definite and accurate information regarding the present standing of the fruit industry in the Niagara fruit belt. Being provided with note book and special blank forms every phase of the work as far as possible was reported on, such as the number of trees of the different varieties of fruit, their age, distance of planting, acres, type of soil, cultivation methods, pruning, fertilization, spraying, fungous diseases and insect pests, crop yields, markets, etc. Although the report form used was quite exhaustive it was not altogether suitable for a complete report of the farms in every case. All farms of four acres and over were visited and reported on, while smaller lots were frequently visited and their condition noted. The writer in every case went over each farm reported and made note of the present condition. During the season 450 farms were reported on and over 500 were visited.

Physiography. From this standpoint the Niagara district requires but little comment at this time, the factors which make it famous for its tender fruits having been treated by writers on former occasions. However, the district includes that part of the counties of Wentworth and Lincoln lying along the south shore of Lake Ontario and north of the Niagara escarpment—the mountain. This strip of land varies from one to three miles or more in width and the area covered in the survey of 1909 includes those parts of the townships of Barton, Saltfleet and North Grimsby lying north of the mountain, or the section extending from Hamilton east about 21 miles. The section indicated is rather flat with a more or less uniform slope from the base of the mountain north to the lake. In several places a stream, gully or a more or less rolling nature of the land will make a slight deviation from the above general slope, but this does not materially affect the general contour or topography.

This general northerly slope gives good atmospheric drainage, reducing the possibility of early frosts to a minimum. The northern slope also retards early spring growth to a greater or less degree, thus reducing the danger of late spring frosts. It also reduces winter injury to a minimum, due to the fact that there is less fluctuation in temperature, and the soil upon freezing in the fall remains frozen until spring, thus eliminating in a very marked degree the damage caused by alternate freezing and thawing during the winter. The large body of water, Lake Ontario, to the north, with its cool winds in summer and warm winds in winter, tends to moderate and unify the climate. The seasonal influences of large bodies of water upon the surrounding country are too generally understood to require further comment.

The Soil. The soil of the Niagara district is of the Medina sandstone formation. This layer of rock from which the soil of the district has been built up forms the lower layer of rock of the silurian age, a geographical division in the rock crust of America. On the top of the Medina sandstone group of rocks comes a series of limestone shales known as the Clinton rock, and above this the Niagara limestone.

The soil formed from this Medina sandstone, and to some extent from other

rock formations, and also the deposits of the old lake bed, which the district is supposed to have been, is of a varying character. The soil ranges from a rather light sand to a heavy red clay, and the nature of the soils in the various sections of the district determines in a large measure the kinds of fruit grown in the particular sections.

In the vicinity of Hamilton and east through Barton township the soil is for the most part a dark loam well adapted to truck gardening, and in this section the farmers go in for truck gardening to a greater extent than they do fruit growing. A good many of them state that truck gardening is the more profitable, and what little fruit they have is to supply their customers in the fruit season. In dividing the district roughly we find from the Red Hill east to Stoney Creek the soil is of a sandy and clay loam nature, and the growers are more extensively into fruit growing, truck gardening being of little importance. General agriculture is, however, followed to a considerable extent in this section. Of the fruits grown

Working in the Demonstration Orchards.

possibly peaches and grapes are the most important, although plums and cherries are extensively grown, as are also the bush fruits. From Stoney Creek to Fruitland the soil varies from a clay loam to a heavy red clay and in this section plums, pears, grapes and apples are most extensively grown, with peaches along the water front and in the shelter of the mountain where the soil is lighter and more sandy.

From Fruitland to Winona the soil is lighter and deeper, being of a sandy or clay loam nature. On this soil peaches again predominate or at least form a greater part of the fruit grown than in the section west of it. Cherries and grapes are also prominent crops. Just in this connection it is worth noting the large number of cherry trees which have been planted in 1908 and 1909, the boom in cherries being due no doubt to the good yields and high prices of the last few years. There is another rather clayey section west of Winona, which is planted to a greater or less extent to those fruits which are more adapted to clay soils than the peach, especially pears, plums and grapes. Deep sandy soil is again encountered. Some two miles west of Grimsby and from here to the eastern boundary of North

Grimsby the soil is mostly a deep sand or sandy loam, which is especially adapted to peaches and this crop is by far the most important in this section of the district.

Summarizing, the soil of the Niagara district varies greatly, ranging from a heavy red clay to a rather light deep sand or sandy loam. The heavy clay appears between Fruitland and Grimsby and also here and there in other sections where sandy and loam soils predominate. A dark clay and sandy loam is the characteristic soil in the vicinity of Bartonville. Sandy and clay loam soils are more or less the predominating soils of the Stoney Creek, Winona and Grimsby sections. The fruits grown on these different types of soil show to some extent the adaptability of certain fruits to certain soils. Thus the type of soil may in a measure be judged by the kind of fruit grown or the kind of fruits may be determined by the type of soil.

Table 1 shows the number of trees or vines of the different kinds of fruit in the three different townships surveyed, and also the total of the three townships.

TABLE 1.

Township.	Apples.	Pears.	Peaches.	Plums.	Cherries.	Grapes.
Barton	3,145	3,806	20,256	7,675	2,502	19,552
Saltfleet	27,527	55,992	218,620	148,297	22,812	703,446
Grimsby	12,624	15,819	140,664	61,255	12,381	284,940
Total	43,296	75,617	379,540	217,227	37,695	1,007,938

Table 2 shows the number of acres of trees and vines of the different kinds of fruit, in the different townships and also the total acreage of each.

TABLE 2.

Township.	Apples.	Pears.	Peaches.	Plums.	Cherries.	Grapes.
Barton	66.1	26.30	129.25	44.50	18.05	41.50
Saltfleet	571.15	281.36	1,081.45	828.55	142.35	1,538.75
Grimsby	269.75	212.00	1,001.50	360.30	73.50	676.65
Total	907.00	519.66	2,212.20	1,233.35	233.90	2,256.90

Table 3 shows the average number of trees or vines per acre for the three townships, and is based on the results of Tables 1 and 2.

TABLE 3.

Kind of fruit trees.	Average No. trees per acre.
Apples	47.7
Pears	145.7
Peaches	171.5
Plums	176.1
Cherries	161.1
Grapes	446.6

Distance of planting of the different kinds of fruit.

In connection with the distance between the different kinds of fruit trees there is considerable variation. Tables 4 to 9 will give an idea as to distances at which the trees of the different fruits are set.

TABLE 4.—DISTANCE BETWEEN APPLE TREES.

Distance apart.	No. of orchards.	Per cent.
40 ft. x 40 ft.	14	7.142
36 " x 36 "	5	2.551
35 " x 35 "	8	4.081
32 " x 32 "	14	7.142
30 " x 30 "	124	63.265
30 " x 40 "	5	2.551
25 " x 25 "	7	3.571
20 " x 20 "	5	2.551
Other distances	14	7.142

TABLE 5.—DISTANCE BETWEEN PEAR TREES.

Distance apart.	No. of orchards.	Per cent.
20 ft. x 20 ft.	26	8.666
20 " x 16 "	9	3.000
18 " x 18 "	22	7.333
16 " x 16 "	79	26.333
15 " x 15 "	52	17.333
14 " x 16 "	12	4.000
14 " x 14 "	16	5.333
12 " x 16 "	9	3.000
12 " x 12 "	16	5.333
Other distances	59	19.666

TABLE 6.—DISTANCE BETWEEN PEACH TREES.

Distance apart.	No. of orchards.	Per cent.
20 ft. x 20 ft.	32	7.209
20 " x 18 "	40	9.302
20 " x 16 "	14	3.255
18 " x 18 "	45	10.465
18 " x 16 "	26	6.046
16 " x 16 "	80	18.604
15 " x 15 "	69	16.046
14 " x 14 "	15	3.484
12 " x 16 "	14	3.255
Other distances	.....	21.950

TABLE 7.—DISTANCE BETWEEN PLUM TREES.

Distance apart.	No. of orchards.	Per cent.
18 ft. x 20 ft.	10	2.785
18 " x 18 "	23	6.685
16 " x 20 "	14	3.902
16 " x 16 "	97	27.019
15 " x 15 "	66	18.387
15 " x 12 "	20	5.571
14 " x 14 "	21	5.849
12 " x 16 "	13	3.642
12 " x 12 "	15	4.178
Other distances	64	21.169

TABLE 8.—DISTANCE BETWEEN CHERRY TREES.

Distance apart.	No. of orchards.	Per cent.
20 ft. x 20 ft.	35	12.962
20 " x 18 "	13	4.814
18 " x 18 "	38	14.075
18 " x 16 "	17	6.285
16 " x 16 "	58	21.481
15 " x 15 "	49	18.148
14 " x 14 "	10	3.703
Other distances	52	18.518

TABLE 9.—DISTANCE BETWEEN GRAPE VINES.

Distance apart.	No. of vineyards.	Per cent.
10 ft. x 10 ft.	93	25.271
10 " x 9 "	45	12.228
10 " x 8 "	118	32.065
9 " x 9 "	27	7.337
11 " x 9 "	11	2.989
9 " x 8 "	19	5.163
8 " x 8 "	11	2.989
Other distances	44	11.995

From these tables it will be observed that the majority of the apples, 63.265 per cent., are set 30 ft. apart each way, while there is an equal percentage of them set 32 ft. x 32 ft. and 40 ft. x 40 ft., namely, 7.132 per cent.

In the case of all the other tree fruits the great majority of the orchards are planted 16 ft. apart each way. In the case of pears 26.3 per cent. of the orchards are set 16 ft. x 16 ft., while 17.3 per cent. are set 15 ft. x 15 ft. and 8.6 per cent. are set 20 ft. x 20 ft. With the peaches 18.604 per cent. of the orchards are set 16 ft. x 15 ft., 16.046 per cent. are set 15 ft. x 15 ft. and 10.465 per cent. are set 18 ft. x 18 ft. In the plums 27.019 per cent. are set 16 ft. x 16 ft., 18.387 per cent. are set 15 ft. x 15 ft. and 6.685 per cent. are set 18 ft. x 18 ft. In connection with the cherries 21.481 per cent. are set 16 ft. x 16 ft., 18.148 per cent. are set 15 ft. x 15 ft., 14.075 per cent. are set 18 ft. x 18 ft. and 12.962 per cent. are set 20 ft. x 20 ft. Of the grapes 32.065 per cent. or almost one third are set 10 ft. x 8 ft., 25.271 per cent. are set 10 ft. x 10 ft. and 12.228 per cent. are set 10 ft. x 9 ft. The tendency lately, however, seems to be to set all varieties of fruit somewhat farther apart than the majority of fruit trees have been planted previously. For instance the tendency seems to be to plant apples 40 ft. apart now while the majority of old orchards are 30 ft. apart. With the other fruits there is a growing tendency to set the trees 20 ft. x 20 ft. or 18 ft. x 18 ft. instead of 16 ft. x 16. ft. or 15 ft. x 15 ft. and with grapes the tendency to set them 10 ft. x 10 ft. instead of 8 ft. x 10 ft. This is noticeable by the fact that a good many of the young orchards being set out are planted at the greater distances.

DRAINAGE. While drainage is a very important factor in connection with the fruit industry, and no variety will stand any great amount of surplus water, still at the same time it cannot be stated that the natural drainage of the section

surveyed is bad. The natural surface drainage of the district for the most part is very good, with the exception of some small isolated areas. The accompanying Table No. 10 shows that a little less than one half (47.9 per cent.) of the farms have nothing but natural or surface drainage.

TABLE 10.—DRAINAGE.

Kind of drainage.	Farms.	Per cent.
Surface drained	215	47.9
Underdrained	124	27.69
Partly underdrained	109	24.33

A little more than one-quarter of the farms are wholly underdrained; that is, all the land set to fruit on one-quarter of the farms, while a little less than one-quarter of the farms are partly underdrained. In some places where there is a deep gravelly subsoil underdrainage is unnecessary. In one place west of Stoney Creek where posts were being set a distinct water current could be noted in the gravel subsoil, at the surface of the water table. Much of the undrained land could, however, be greatly benefited by the thorough underdrainage, although the area of land is small which is of little or no value unless underdrained.

The season of 1909 being very dry during June, July and August, land which might under ordinary circumstances need underdraining, was in very good condition. In some orchards and with some varieties of fruit damage caused by lack of drainage was to be observed, but the extent of the damage could not be determined.

FERTILIZATION. The district being devoted almost entirely to fruit growing it is difficult for the fruit grower to get sufficient quantities of farmyard manure. As a result a large number of the growers are using commercial fertilizers and other manures, with or without all the obtainable farmyard manure, as a means of keeping up the fertility of the land. Table 11 goes to show in a general way the extent to which the different fertilizers are being used. The greater portion of the growers, 60 per cent., still use nothing but farmyard manure. To be more exact it would be better to apply the term stable manure instead of farmyard manure since the greater portion of it comes from city and nearby village stables.

TABLE 11.—FERTILIZERS.

Kind of fertilizer.	No. farms.	Per cent.
Farmyard or stable manure	251	60.047
Stable manure and commercial fertilizer	84	20.095
Stable manure and cover crop	49	11.720
Stable manure and ashes	20	4.784
Other fertilizers as sewage disposal, night soil, sludge, compost, cover crop alone, etc	14	3.349

20.095 per cent. of the growers are using commercial fertilizers along with the stable manure. 11.72 per cent. are using cover crops along with the manure, this method being most extensively followed on the heavier types of soil and in connection with apples, although to some extent with other crops. Ashes are recog-

nized as a valuable manure, and are used whenever obtainable, more growers recognizing their value than can obtain them. 4.784 per cent. of the growers use ashes as part of their regular fertilizers, while only 3.349 per cent. of the farms receive nourishment from fertilizers other than those mentioned. Of these sewage disposal, sludge, night soil and compost are most common.

In no case do the growers resort to one kind of fertilizer alone, except in the case of farmyard manure, but they do use special fertilizers for special crops, and invariably you will find that stable manure forms a part of the fertilizer applied to the farm as a whole. In only three or four cases do we find the fertility being kept up entirely without the use of farmyard manure, these cases being with cover crops, the cover crops used being clover or hairy vetch. The crops most frequently used for green manuring are clover, hairy vetch, peas, rye, rape and occasionally turnips sown thick.

Ashes are valuable as a fertilizer and at the same time they are an extremely scarce commodity. In one instance (Report Form 158) a fruit grower has used with great success ashes from an old soap factory which have been laying in an exposed heap for years, also air slaked and weathered lime from a lime kiln. The value of both the ashes and lime had been seriously depleted by exposure. but the low figures for which they were obtained rendered them very profitable fertilizers to use, and gave excellent results when liberally applied. Last season the results were especially noticeable on strawberries.

The farmyard manure made in the first section represents only a small portion of the manure used. Besides all the locally made manure large amounts are hauled from the villages and from Hamilton. Farther east where it is impracticable to haul the manure from Hamilton it is shipped in by the car load, from Toronto chiefly. This trade in stable manure from Toronto is on the increase and fruit men are commencing to use more or less extensively the Toronto compost and other stable manure. This manure shipped in costs the farmer in the neighborhood of thirty dollars per car load laid down at the nearest station.

Commercial fertilizers are being quite extensively used, and as the table indicates 20.095 per cent. of the fruit men are using it in some form or other. Commercial fertilizers are used in connection with stable manure and for special crops, chiefly where quick returns from the manure are desired. As with all other commercial commodities there are always a number of fruit men ready to give free information as to the uselessness of commercial fertilizers as a result of their own or their neighbors unsuccessful experiment with them. However, in most cases where commercial fertilizers have been used intelligently good results have been obtained. Results were especially noticeable with strawberries, raspberries and other small fruits, and a number of growers had very striking results.

Phosphoric acid, potash, and nitrate are being used separately and in various combinations as complete fertilizers. Among the fertilizers most extensively used are super phosphate, muriate of potash, nitrate of soda, bone meal, dried blood, bone and flesh and several forms of complete fertilizer. Some growers mix their own complete fertilizer in whatever proportions they desire from the special fertilizers.

Tillage. Owing to the fact that the soil of the district varies from a heavy red clay to a light, deep, sandy soil with all the intermediate types, and that the fruits grown represent all the tender kinds as well as the apple, the treatment of the various types of soil differs with the soil and, to some extent, with the kind of fruit grown. Clay soil, for instance, requires quite different treatment than the

sandy soil. It is unmistakably beyond the question of sod versus cultivation in the orchards. The question is what tillage methods will give the greatest returns for the labor applied.

In a general way it may be stated that the heavier clay soils will require fall plowing in order to give the best results, while the light sandy soils give the best results when plowed in the spring. In both cases the plowing is followed by thorough summer cultivation. From the information gathered no definite rule is applicable, but Table 12 will show the extent of the methods followed in regard to plowing:

TABLE 12.—TIME OF PLOWING.

When plowed.	No. of farms.	Per cent.
Spring and Fall	285	66.743
Fall	90	21.077
Spring	44	10.304
Disc alone	8	1.850

Exactly two-thirds of the growers plow their fruit land both in the fall and spring. Twenty-one per cent. plow in the fall only, 10 per cent. plow in the spring only, and 1.85 per cent. use the disc harrow instead of the plow. This latter practice is followed only on the deep sandy land. In all cases, no matter when the land was plowed, the summer cultivation was much the same, being continuous surface cultivation throughout the season. If the grower used cover crops, cultivation usually ceased about the middle of July or first of August, and sometimes as early as the first of July. On the other hand, where clean cultivation throughout the whole season is practised surface cultivation is continued somewhat latter. Some growers follow with more or less regularity the rule, cultivate until cultivation interferes with the crop. At any rate, the general practice is to cultivate regularly and cease before the thorough maturing of the new growth is interfered with. The frequency of cultivation during the summer will depend upon the ideas of the individual fruit grower, the type of soil, the extent of the weeds, etc. The number of times the land is cultivated will vary from three or four during the season to as often as twice weekly. In the majority of cases cultivation is continued until the end of July at least, and usually ceases before the first of September. Cover crops when used are sown between the first and last of July or first of August, depending on the season.

The season of 1909 being dry, the destruction of weeds by cultivation was a comparatively easy matter, the result being that when the fruit grower found that the weeds would give no more trouble he ceased cultivation, instead of continuing when cultivation was most essential for the conservation of soil moisture. A large number, but by no means all the growers, followed this method; some going so far as to roll the land, making the surface compact, thus increasing evaporation and incurring upon themselves additional loss from drought.

A striking example of the detrimental effects from plowing extremely light sandy peach land in the fall was shown in a peach orchard at Grimsby along the lake shore. One-half of the orchard was fall plowed in 1908, and had no fruit whatever in 1909, while the other half not plowed in the fall of 1908, but in the spring of 1909 and exactly the same varieties, bore a heavy crop.

Pruning. The report form used was not adapted for reporting fully the cultural methods of the different kinds of fruit. Consequently in the case of pruning in particular the report had to be of a very general nature. In most cases, however, pruning is carried on more or less systematically and annually. A few fruit growers, however, such as those who have employment in the city and some others, neglect this important factor in the production of good fruit.

As to the time of pruning, from late winter to early spring pruning is quite universal and necessarily so. June may be, and no doubt is, the best time to prune, but it is too busy a season for most growers even to consider pruning, and if left until June would be laid over for the year.

Severity of pruning is so variable with the ideas and conceptions of the individual fruit men that it is difficult to explain just what constitutes light, medium, or severe pruning. What one man considers heavy pruning another may consider it to be just medium or *vice versa*. The fact remains that good regular pruning is necessary for the best results, and while the greater number of the fruit men prune regularly, some of them do not prune thoroughly. From the information gathered it appears that the majority of the fruit men simply thin out their trees and head in or cut back when necessary to keep the tree within bounds. There are a number of fruit farms where the trees are exceptionally well pruned.

Diseases and Insects. The codling moth, the worst enemy of the apple last season, was very numerous or scarce, depending upon the thoroughness and the extent of the spraying for its control. Those who made a study of this pest and sprayed thoroughly and at the proper time succeeded in controlling it, and in such cases the fruit was from 90 to 98 per cent. free from codling moth larvae, while in orchards where this pest was not closely watched or the spraying so thoroughly applied, as high as 80 per cent. of the fruit was affected.

The codling moth larvae, although the worst pest of the apple, may be effectively controlled if closely observed and thoroughly sprayed for.

Apple Scab. Owing to the dry season there was but little apple scab noticeable, and growers paid but little attention to its special control.

Twig Blight. This disease affected a very large number of the bearing trees last year, and was in evidence to the greatest extent on trees which were carrying a crop rather than on trees for which 1909 was the off season. (See Bulletin 176, Ontario Department of Agriculture.)

Pear Scab. Similar to the apple scab this disease was not as prevalent as in former seasons, but was quite frequently in evidence on the Flemish Beauty variety where spraying had been neglected.

Pear Blight. This is the most serious pest on the pear, works its ravages more or less regardless of seasons, and last season did a great deal of damage. (See Bul. 176, Ont. Dept. Agrl.)

Plum Curculio. Although not so bad as previous seasons, the plum curculio did considerable damage in some places to the plums and apples. On the apple the fall work of the curculio was most in evidence, in some instances disfiguring large numbers of the fruits.

Aphids. The unexpected outbreak of the aphids did considerable damage to all classes of fruit, and caused considerable alarm, but not sufficient to cause any radical steps to be taken. The aphids are seldom found in sufficient numbers to cause very serious damage, but are liable on certain favorable seasons to break out causing a good deal of damage. Last season the ravages of this pest were not

confined to the fruit trees alone, but shrubs, ornamentals and forest trees, as well as fruit trees were alike attacked. A rainy season is usually an efficient check, and as last season was dry they seemed to develop unchecked. The damage done by the aphids was most noticeable on the apple, where it caused a great deal of the fruit to be woody, small and misshapen. It is doubtful, however, if there will be another outbreak of the aphids for some time.

San José Scale. This scale insect, which is the most harmful insect we have, attacking all classes of fruit, is to be found to a greater or less extent in almost every part of the district surveyed. In most cases, however, it is being very effectively controlled. There are, however, a few cases where this pest is very bad, and is spreading almost unmolested within the orchards where it was noticed. In the vicinity of Stoney Creek the San José Scale is quite numerous, and in two or three cases practically nothing is being done to keep it in check, except the inspector's axe, which might be used a little more effectively.

Peach Leaf Curl. During last season peach leaf curl did a great deal of damage, and in connection with this disease some very convincing spraying results were to be observed. The spring of last year being wet and backward, rendered spraying at the proper time difficult. This gave the peach leaf curl a chance to develop, and it defoliated many orchards, causing a total loss of the crop.

Where growers sprayed early and got their lime and sulphur applied before the wet weather set in, they succeeded in controlling the fungus diseases. These undisputable results will, no doubt, have their influence toward more thorough spraying in the future.

Other diseases and insects, such as the Shot-hole Borer, Bud Moth, Oyster Shell Scale, Canker, Plum Rot, Peach Yellows, etc., were in evidence to a limited extent. Of these the peach yellows did the most damage, especially around Winona and Grimsby. In the vicinity of Grimsby the Yellows is spreading rapidly, and some of the fruit men fear a repetition of the outbreak of several years ago. In the case of the Yellows, as with the San José Scale, a more rigid enforcement of the law would be very beneficial.

Spraying. The spring of 1909 was very unfavorable to thorough and effective applications of the first spraying on the dormant wood. Spring opened with fine weather early, but before very much spraying was done the weather turned cold and wet, and continued for considerable time, or until it was too late to spray with lime and sulphur, or other dormant wood spray material. As a result a great many of the fruit growers did not get their first spraying done. The effect was to be observed in the enormous amount of peach leaf curl to which the Elberta variety seemed particularly susceptible.

For the later sprayings on the foliage and the fruit the season was quite favorable, being dry after May 24th, and for the most part efficient results were obtained, especially with the codling moth larvae, and in fact all leaf eating insects and fungus diseases where the spraying was done thoroughly.

Spraying Mixtures. The mixtures which may be considered as standard are lime and sulphur wash and Bordeaux mixture with a poison. Lime and sulphur wash is the mixture used almost exclusively on the dormant wood, either the commercial or the home-prepared being used. The home-prepared, self-boiled, and the commercial brands of lime and sulphur are becoming popular as mixtures for summer use. Experiments so far conducted have not proven conclusively their value, but they go to show that these preparations should and, no doubt, will become very effective preparations for summer spraying, against fungous diseases,

and with an arsenical added will make efficient insecticides as well. (For full study of lime and sulphur wash, see Bul. 177, Ontario Department of Agriculture.)

The commercial brands of lime and sulphur which have been placed upon the market within the last few years are becoming quite popular and extensively used, due to the fact that they eliminate the dirty and rather laborious task of boiling the mixture. When properly applied these give quite satisfactory results, although to be as effective as the ordinary home-boiled mixture they usually have to be applied in a somewhat stronger solution than the manufacturers recommend, which makes the material cost considerably more than the home-prepared lime and sulphur wash. Bulletin 177 deals fully with these mixtures also.

The chief brands of commercial lime and sulphur wash which are being used in Ontario are: Niagara, Vanco and Rex.

Bordeaux mixture, the standard summer spray, is too well understood to require any comment here, except to state that a number of growers are using a great excess of lime over the amount ordinarily used. The poisons lead arsenate, calcium arsenite and Paris green, are all used as insecticides, lead arsenate being the most extensively used. Other spray mixtures, such as lead arsenate alone, Gillett's lye, tobacco water, whale oil soap and lye and other emulsions are being used to a very limited extent.

Markets and Marketing. The fruits of the Niagara district go to a rather cosmopolitan market. A great deal of the fruit grown within handling distance of Hamilton is sold upon the open market. During the fruit season buyers from Toronto and other cities purchase a good deal of fruit on the Hamilton market and have it shipped out, especially to Toronto by boat. The large portion of the fruit sold on the local market is for home consumption. Other markets which consume the output of the district are the commission markets in all the large cities of the Province and also Montreal, local fruit dealers and the private customers of the individual growers.

Far too much of the annual output of the fruit finds its way to the commission market, which is not conducive to the best prices nor to the proper development of the industry. There is too great an opportunity for unfair dealings on the part of the commission merchant towards the producers who supply commission markets. It is true that there are honest, reputable men in the commission business, and at the same time there are a few growers shipping fruit on commission who have not suffered as a result of too great a trust in the commission business. There is little or nothing to commend the commission market to the fruit grower as an outlet for his fruit. It is absolutely impossible for him to tell whether he is receiving honest returns or not, and he has no means of finding out. On the other hand, the commission man has several ways in which he may outdo the fruit grower, such as reporting the fruit as arriving in bad condition. At best the system is a bad one, and the sooner the growers co-operate in the marketing of their fruit the sooner will these evils be reduced to a minimum.

The dealer having his own private customers is possibly in the most desirable position. He is absolutely sure of his market, which is what he makes it, for he knows that he has to supply a first-class article, and as long as he does this his market will develop, but if he tries to pass off inferior goods on his customers it is himself that eventually suffers.

The local dealers, as a rule, are supplying a similar trade to the grower with customers, but on a much larger scale, and they give better satisfaction to the

grower than the commission market. The local dealer often buys more than he has a market for, and in this case he turns the surplus over to the present necessary evil, the commission market.

The western market is an ever increasing market which can consume all the tender fruit which the Ontario growers can place out there. The amount of fruit placed on that market is increasing annually, and when proper transportation is obtained there will be no excuse for the common complaint that the fruit business is being overdone.

The most desirable condition and one which the growers are beginning to realize is an extensive co-operative system which would involve the whole district and absolutely control the entire output. Better markets could be obtained, better transportation facilities and shipping rates, a more staple and uniform grading which would result in uniformly better prices. Under such a system there would be less danger of a glut in the market as the output could be distributed more advantageously. The evil of the existing commission market would be overcome and also many other minor detrimental conditions which exist. To be convinced of this fact one only has to note the success of the co-operative societies already formed and the evils which the growers have to contend with in marketing their fruit where there are no united efforts.

The Season of 1909. The season of 1909, we may say, broke in rather unfavorably, the spring being very wet and backward. Nevertheless, the crops for the most part were good. After the wet spring, June, July and part of August were very dry and some crops, such as plums, were seriously interfered with. The plums dried up and dropped off in very large numbers, while the early peaches were inferior in size. The raspberry and strawberry crop was rather short as a result of the dry weather. Not only the dry summer, but also the wet spring, interfered somewhat with the peach crop, the wet season accounting partly for the enormous amount of peach leaf curl which was particularly bad on the Elbertas.

On August 16th, when the dry weather was about to break, a severe rain and hailstorm swept over Grimsby village and vicinity, doing enormous damage to peaches and grapes in particular and also to the plums. The fruit was badly bruised, and in the case of peaches the whole side of the peach was often knocked off. Several growers estimated their loss at over the thousand dollar mark.

Taking the season as a whole, crops were good throughout the entire district surveyed, except along the lake shore, from Stoney Creek west to Bartonville, a section where peaches have been a failure for a number of years.

In conclusion the writer desires to thank the growers of the district for their hospitality and the courteous and willing manner in which they gave the information desired.

ORCHARD SURVEY OF THE LAKE HURON SHORE.

S. E. Todd and T. B. Faulds.

Purpose. The purpose of this work was to make a general study of the horticultural situation in the Lake Huron district: to examine the geographical, topographical, climatic conditions; to note in the different sections the extent of the industry, management and care given, advancement or retrogression shown in such things as acreage of fruit, interest in and profits derived from fruit culture:

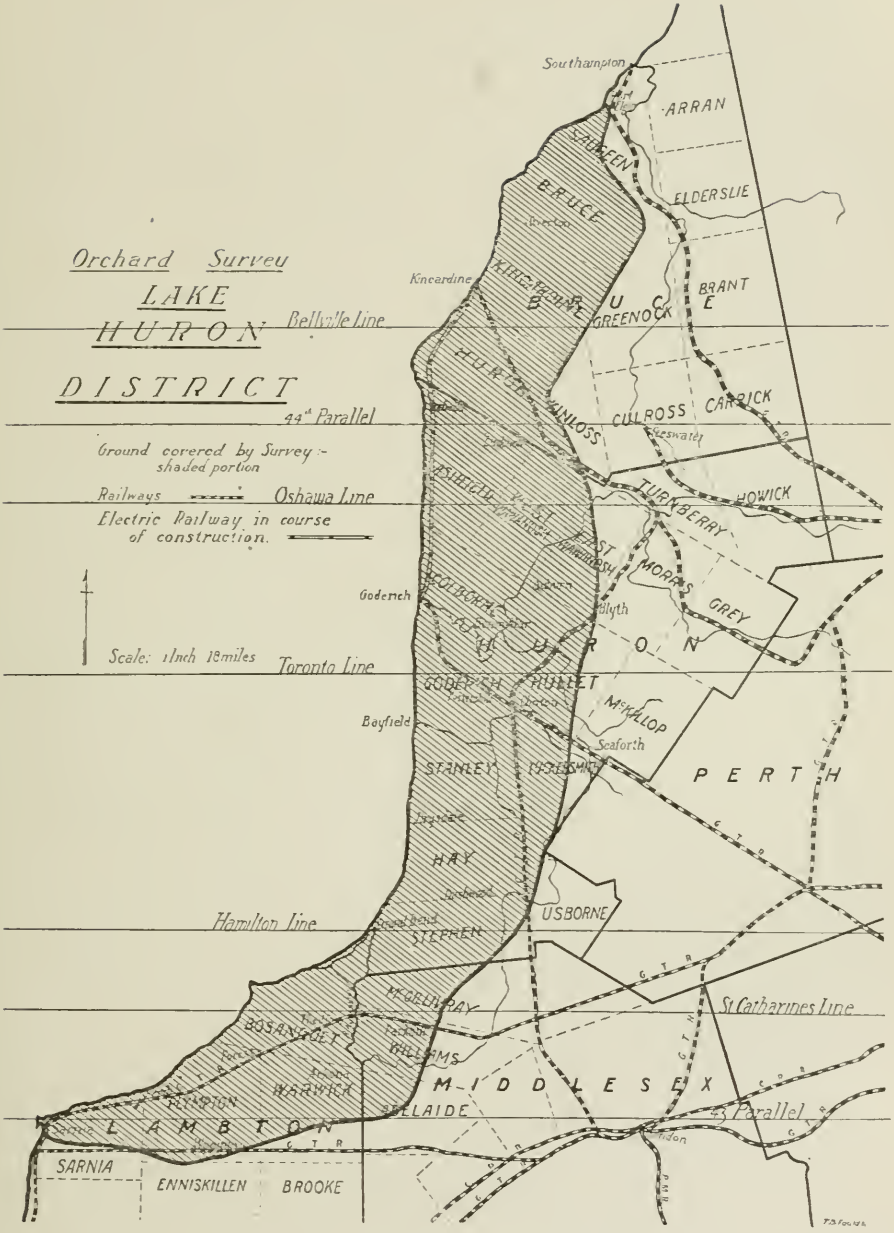
and to note the causes of such advancement or retrogression; to study, in short, the district's horticultural conditions and more immediate necessities.

Method. To obtain the desired information a farm-to-farm survey was planned and executed. A blank form, resembling those used for similar work in the various States of the Union which have prosecuted like studies, was used. This blank, when filled out, contained the following information: Name of owner, post office, county, location, site, township; acres in farm; varieties, number of trees, age and acreage of apples, pears, peaches, plums, cherries; acreage of bush fruits and distance of planting; type of soil, subsoil, drainage, tillage; if sod, kind and number of years so kept; method of treatment; spraying, fertilizers, pruning, with particulars of each, diseases and insects noted and present condition of orchards; yields, prices and income for three years back, also method of sale. Note was also made of any information regarding the section that could be gleaned while talking to the farmer and fruit grower. Needless to say in many cases full information on all these points could not be obtained as farmers generally are poor bookkeepers, but about fifty per cent. were able to supply fairly accurate information, so that the data gathered is fairly correct and can be relied on.

No attempt was made to make a complete census of all the orchards in the district, but a sufficient number were visited in each section to give an accurate idea of conditions and to supply trustworthy information. In all about five hundred orchards were visited. In sections where little orcharding is done only sufficient time was spent there to ascertain the reasons for this and to study the topographical, soil and drainage conditions with a view to future possibilities. The figures for 1909, shown in the various tables, were obtained by correspondence. Comparatively few returns for 1909 were received from neglected orchards, and for this reason Table III. could not be completed for that year.

Geographical Location. The geographical location of the district covered was what is known as the Lake Huron winter apple section, comprising those parts of the counties of Lambton, Middlesex, Huron and Bruce that border on, or approach, Lake Huron, and extending inland about fifteen to eighteen miles. The thick line on Map A indicates approximately the ground covered, but is not intended to denote the limit of the apple growing section, so far as climate is concerned. It would be a hopeless task to attempt to trace with any degree of accuracy the limit of commercial apple growing eastward from the lake. The best part of the fruit section of Bruce County lies outside the line of the survey, but owing to lack of time could not be covered.

Topographical Features. This district offers some very interesting studies in topography. Beginning at that point where Lake Huron narrows to the St. Clair River and following eastward, the lake shore is low and mostly sandy till Perch, on the Chicago, Port Huron and Montreal line of the G.T.R., is reached. From there a gradually rising bluff of stiff clay is found which extends to about the site of the old village of Hillsborough—now removed—a distance of eighteen miles. Against this bluff the restless waters of old Lake Huron beat remorselessly and continually wear away the land and carry it out into the deep. At Hillsborough the bluff recedes inland gradually and the character of the land changes from clay to loam. The bluff recedes until at Mr. D. Johnson's, Forest, it is over a quarter of a mile from shore. The flat below at this point consists of a deep, rich, gravelly loam and clay with streaks of sand. Farther north, near Ravens-

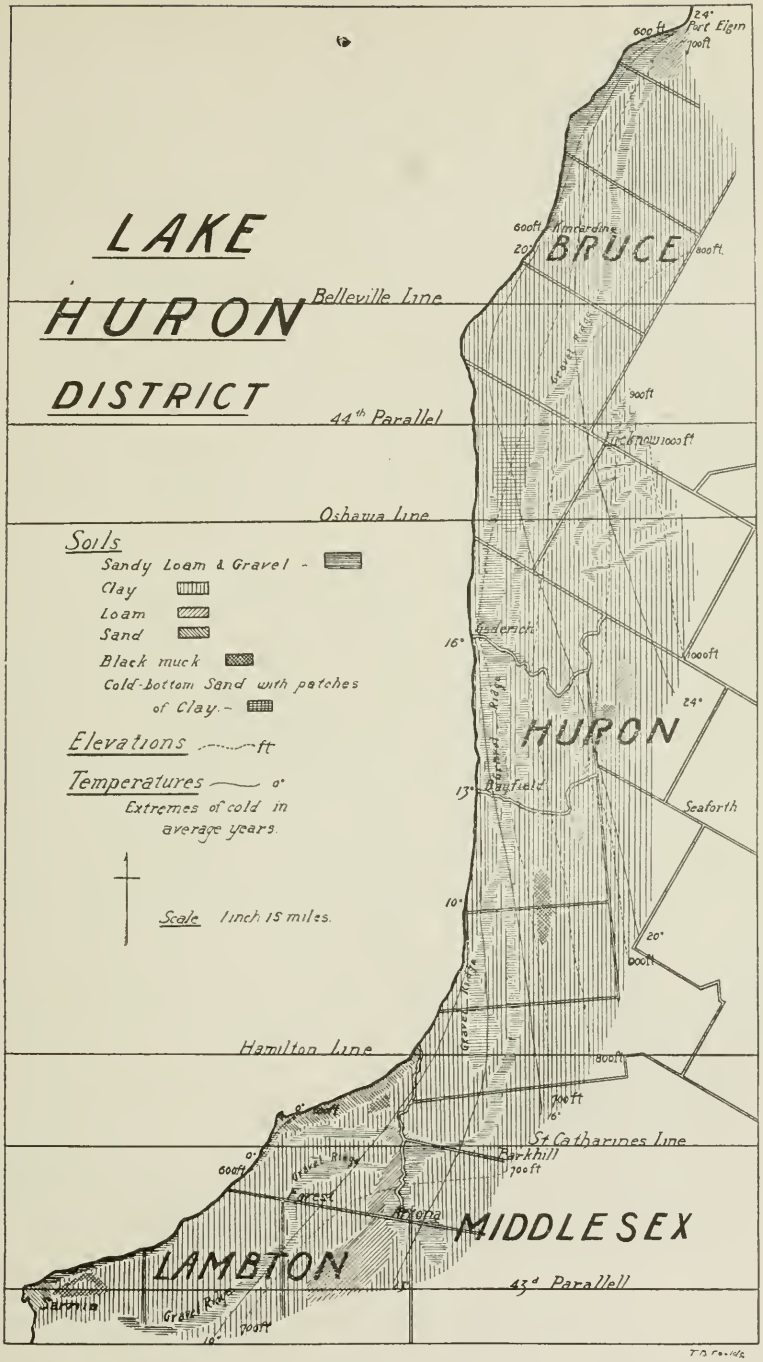

Orchard Survey
LAKE
HURON
DISTRICT
Ground covered by Survey:-
shaded portion
Railways
Electric Railway in course
of construction.
Scale: 1 Inch 18 miles
Bellville Line
44th Parallel
Oshawa Line
Toronto Line
Hamilton Line
St Catharines Line
Parallel
Southampton
ARRAN
ELDERSLIE
BRANT
GREENOCK
CARRICK
CULROSS
HOWICK
TURNBERRY
MORRIS
GREY
HURON
PERTH
USBORNE
MIDDLESEX
LAMBTON
SARNIA
ENNISKILLEN
BROOKE
Kincardine
Goderich
Bayfield
Seaforth
Clyth
Lucknow
Wroxeter
Listowel
Exeter
Strathroy
Sarnia
London
Brooke
Enniskillen

MAP A.

wood, the loamy bluff gives way to a strange formation indeed. Here the land becomes broken roughly into two parallel ranges of peculiar sand dunes. The peaks of many of these dunes rise to one hundred feet, and consist of drift sand which gleams brightly in the sun. This formation is about two miles wide and extends to Grand Bend, a distance of fourteen miles. At the lake shore, a short distance north of Grand Bend, the clay bluff begins again and gradually rises until at Goderich it reaches a height of about 110 feet. The character of the bluff right at Goderich is gravelly, of which further note will be made. About a mile above the town the bluff changes to clay again and extends to within a mile of Kincardine, a distance of thirty-five miles, approximately sixty feet in height. Here the bluff recedes from shore again for nearly a mile—in places two miles—and becomes broken by many gullies. Much of the land below the bluff is broken and rocky. It is sandy around Kincardine, but stiff clay is again encountered farther north. The bluff is not so steep north of Kincardine, and presently becomes a hill which extends to Port Elgin, where the land is again loamy in character.

Some miles inland is a gravel ridge which appears to be an ancient shore line extending, with only one or two breaks, continuously from a point about four miles from Sarnia, near Mandaumin, right through to Port Elgin. It would seem that the western base of this ridge is dead level for its entire length. From Mandaumin the ridge extends north-easterly, passing about a mile north of Wyoming, runs through Forest and on to Thedford. A little north of Thedford the character of the country changes suddenly. The eastern boundary of Lambton County at this point, is marked by the Aux Sables River, which flows northerly to the village of Grand Bend at the extreme north of the county. At this point and within eighty rods of the lake the river suddenly bends back and flows southerly, within a mile of the shore, down between the two great ranges of sand dunes noticed previously. The land lying within this great bend of the river is mostly low, flat and swampy, consisting of clay, black muck and sand. Beginning again near the northern boundary of Middlesex the gravel ridge runs northward, passes in the neighborhood of Dashwood, a little west of Zurich, and from there begins gradually to approach the shore until at Goderich the lake bluff itself consists of gravel and sand. This land immediately around Goderich would appear never to have been submerged. The ridge receding from the shore above Goderich, passes northward through the eastern part of Ashfield Township and crosses into Bruce County, about a mile east of Lochalsh post office. From there northward the ridge becomes less marked, but appears gradually to approach the shore till at Port Elgin it again becomes a part of the lake bluff.

It is a remarkable feature of the topography of this district that this gravel ridge is the division line between two soil types. East of this ridge the land is plainly glacial, while on the west side it is just as plainly deposition soil. Here the land is mostly flat with a gentle slope to the lake, and in a great deal of this section the drainage problem is, or has been, acute. East of the ridge the land is gently undulating, but in the north-east part of Warwick Township, and the south-east of Bosanquet in Lambton, and in the north-west corner of Middlesex, the undulations become more pronounced until they reach the dignity of hills. North of Thedford the land falls away abruptly to the river flats of the Aux Sables. The southern part of Huron County, east of the ridge, is gently undulating, the general trend being towards the lake. Farther north, however, in the central portion of the county the land becomes rolling, and in the Township of Wawanosh is very hilly. The greater part of the southern and western part of the County of Bruce


LAKE
HURON
DISTRICT
Belleville Line
44th Parallel
Oshawa Line
Hamilton Line
St Catharines Line
43d Parallell
Soils
Sandy Loam & Gravel
Clay
Loam
Sand
Black muck
Cold-bottom Sand with patches of Clay.
Elevations ft
Temperatures 0°
Extremes of cold in average years.
Scale 1 inch 15 miles.
BRUCE
HURON
MIDDLESEX
LAMBTON
Port Elgin
Amcardine
Kincardine
Goderich
Seaforth
Clinton
Parkhill
Mt Elgin
Sarnia
Grand River
Thames River
600ft
700ft
800ft
900ft
1000ft

MAP B.

is flat, or gently rolling, but the Township of Kinloss resembles Wawanosh to the south of it.

Soil. The character of the soil in the hilly regions east of the gravel ridge is exceedingly varied, consisting of glacial clay and gravel ridges with patches of loam and sand, notably in the region around Arkona in Lambton and Middlesex. The more gently rolling and flat land is uniformly clay, or clay loam, with some patches of a lighter character. West of the ridge, with the exception of those patches below the bluff at the lake, the region of the sand dunes in Lambton around Goderich, Kincardine and Port Elgin, the soil is a clay or clay loam, for the most part overlaid with a deposition of varying depth and distance. In Lambton County and South Huron a great deal of the deposition is rich vegetable mould, while in Northern Huron a part is of the same nature and a part is of sand, which varies from a few inches to three or four feet in depth. Most of the latter land is called "Cold bottom land," because the clay subsoil holds the water, thus retarding proper drainage. That part of Bruce County west of the ridge is very like North Huron.

Drainage. East of the ancient shore line in the glacial region the drainage problem is not great. Fruit trees in this region generally do not show any lack of drainage. West of the shore line, however, the case is very different. In many sections when the settlers in the early days planted a few trees they did not thrive because of poor drainage. In undrained or poorly drained land to-day the fruit trees there are very poor, flat-topped, scraggy and affected with canker. The result is that the people of these districts have grown away from the culture of fruit and have given their thoughts entirely to other lines of agriculture. However, here and there are seen younger plantations on land that has been well drained, that are as fine as any in the whole district. In the flats west of Forest, extensive drainage work has been done, and here some of the healthiest and most remunerative orchards in the whole district are to be found. Plainly, drainage is the primary problem in fruit growing in these sections.

Climate. The great area and depth of Lake Huron has a very marked effect on this whole district. So very marked is this effect that at Goderich, right at the lake shore, is to be found a block of about 500 peach trees ten years of age and looking well indeed considering the care they have received. At St. Josephs, Huron County, the thermometer seldom falls below minus 10 degrees F., while at the same time at Zurich about four miles inland, it registers about minus 18 degrees F. At Forest when the thermometer is at minus 10 degrees, at the lake shore northwestward below the bluff a distance of about seven miles, the thermometer registers 0 degrees, and, in fact seldom falls below this point.

The district covered by the survey lies approximately between latitude 43 degrees and 44 degrees 50 minutes. The altitudes vary from 582 feet at the shore line to 1080 feet at Blyth, Huron County. The temperature varies as per lines shown on map B. A temperature lower than minus 25 degrees F., is very exceptional in any part of the district covered, and the high humidity, particularly near the shore, is a powerful preventative of winter killing. There is practically no winter injury to apples south of Clinton.

Extent and Present Condition of the Industry. Although apples have been grown in this district ever since the first settlers arrived, the industry is

still in its infancy. A few sections are waking up to the immense possibilities of the country in which they are fortunate enough to be situated. In Lambton the people are beginning to have faith in their own county, and new plantations, both of apples and peaches, are being made. The older plantations are being better cared for, with the result that they are yielding and paying handsomely. In northwest Middlesex there is a section of loam land where considerable planting of fruit has been done, but which is very poorly cared for. In Huron County the most thickly planted apple section lies between Goderich and Bayfield, but only a few of these orchards are properly cared for. The central part of the county is also slowly growing into fruit, chiefly apples. That part of the County of Bruce included in this survey has only a few commercial orchards. The acre orchard, the usual size there, is generally poorly kept and very little new planting is being done.

At one time quite extensive peach plantations existed in Lambton, but when the "peach curl" became serious nothing was done to protect the trees which resulted in almost completely destroying not only all plantations there, but also the faith of the people in the business. If the apple trees of the County had died from the attack of scab, as did the peach trees of curl, it is quite probable that the apple industry would likewise have disappeared. About ten or twelve years ago, however, a few daring people planted again, and, with the aid of spraying, succeeded in overcoming the "curl". These orchards are scattered over quite an area and denote fairly well what may be done in peach growing. The great freeze of 1904 did not seriously injure these plantations, and they are now bearing heavily. The result has been a revival of peach growing, and during the last two or three years thousands of trees have been planted. There is quite a large area of "peach soil" in this county within the temperature limits of minus 10 degrees F. At St. Joseph, in Huron County, a small experimental peach orchard has been planted, and is now two years old and doing well. At Goderich, as already mentioned, there is a ten year old peach orchard now growing and bearing fairly well. What the possibilities of the future are can only be determined by further experiment. A glance at the accompanying map will show that practically all of Lambton County is south of the St. Catharines line and has a very similar situation to the Niagara peach belt in relation to the lake. Here and there are found peach trees twenty-five years old still hale and hearty in spite of peach curl and bad pruning methods.

Sour cherries are grown in various sections of the district covered, particularly in Colborne township, Huron County, and in parts of Lambton. The sour cherry prefers a sharp well drained soil.

Sweet cherries are growing well in Colborne township, where the industry is increasing in importance. There are sweet cherries found here of considerable age and very thrifty appearance. The soil they grow best on there is a gritty glacial clay loam.

The acreage of fruit set compared with the acreage available and suitable for planting is very small. In Lambton, the area set in fruit is increasing and the industry is attracting considerable attention. Orchards are receiving better care and the resulting increase in profits is attracting attention, and stimulating effort toward better cultural methods. Spraying is becoming general in this county, but much of it is poorly done. There is much need of improvement in spraying, cultivation and fertilizing.

In north-west Middlesex there is a fine section of country with a considerable

acreage of apples, but little cultivation is done, and the apple industry is at a standstill or going backwards. The causes seem to be poor selling methods and the general indisposition of the people to fight insects and fungus diseases. Scab and codling moth are very bad, but very little spraying is done.

In south Huron very few commercial orchards are to be found, and those few are generally neglected. The people have given more attention to extensive grain and stock-farming, than to intensive fruit, dairy and poultry farming. However, even in this district the activity of the central part of the County is being felt, and a few young plantations of commercial size have been planted within the last five or six years.

The great bulk of commercial orchards in Huron are found in the townships of Goderich and Colborne. A fair scattering is to be found in Stanley, north-west Tuckersmith, Hullett, Wawanosh, Ashfield, and Morris. In all these townships the acreage is increasing, quite a number of apple orchards being found, from one to six years old.

The old orchards in this county are quite generally neglected and some contain many poor varieties. There is a general impression that an orchard forty years old is not worth taking care of. In contradiction of this impression some of the most remunerative orchards seen in the county are old, but are receiving proper care and management. It is very unfortunate that this impression has got so firm a hold in the minds of the people, as, where the varieties are good, there is no investment of money or time that will give such good results as that necessary to prune, spray, cultivate and fertilize these same old orchards. From results seen in Lambton County these old orchards will return 100 per cent. on the time and capital invested in them, but improved methods of culture and management must be adopted.

The younger orchards are receiving somewhat better care, but even these are generally poorly managed. Spraying is anything but common and many orchards are cropped with grain while quite a percentage of orchards under twelve years old are in sod. However, there is an increasing interest in the industry, many orchardists reporting spraying this year for the first time. The outlook is hopeful and improving. In Goderich and Colborne Townships, interest is rapidly increasing, the difficulty which retards more thorough and intelligent orchard management being a lack of a proper selling system. With the adoption of co-operative selling methods, a great and immediate improvement in orcharding will undoubtedly take place.

In that part of Bruce County covered by this survey the small orchards receive little care and are infested by insects and scab to a degree that makes better methods of management absolutely necessary if profits are ever to be realized from these orchards. The old orchards also have quite a large percentage of poor varieties. Very few young plantations are being made and the people generally do not recognize how much nature has favored them.

Nursery Stock. Nursery stock is secured from various sources, both Canadian and United States. Some of the stock is grown in Huron and Bruce Counties. Generally the apple stock is fairly good. The peach stock, however, is poor. Big, overgrown, one and two year old trees are quite generally used which are headed very high. Some of the more experienced growers are finding how disastrous to success this class of stock is and are now buying trees three to four feet high, rather than five to six feet as previously. These are being headed about 16 inches from the ground with the result that fine young trees are being

produced. Care should be exercised by prospective planters in securing suitable nursery stock, as the class of peach stock which has generally been planted in this section is considered worthless by experienced growers.

Soil and Management. Of the orchards recorded about 70 per cent. were in sod and pastured. Of the remaining 30 per cent. about 12 per cent. were given clean cultivation and the remaining 18 per cent were cropped with grain, roots or hay. A study of the tables appended shows that cultivated orchards, given the same treatment as sod orchards, yielded in 1907, 12.5 barrels; in 1908, 13.5 barrels and in 1909, 13 barrels per acre in excess of orchards kept in sod. In the following tables neglected orchards were not reckoned.

Table 1.

	1907.		1908.		1909.		No. of	
	Bbls. per acre.	$ per acre.	Bbls. per acre.	$ per acre.	Bbls. per acre.	$ per acre.	Acres.	Orchards.
Cultivated, sprayed, fertilized.....	50	124	32	57	51	76	147	29
Sod, sprayed, fertilized, pastured....	37.5	54	18.5	21.5	38	54	238	36
Cultivated, cropped, fertilized.....	21	29	6	6	16	16	64	11

These figures speak for themselves and need little comment. True, many good orchardists practise sod culture with fair results, and yet not only from the facts presented here, but also from observation during the summer, it is safe to say that it pays well to practise clean cultivation.

Of those orchards receiving clean cultivation only a small per cent. are sowed to cover crop. The popular practice is to plow in spring, cultivate more or less thoroughly during the spring and summer until the middle of July or first of August and then let lie. If a cover crop of clover were sown when cultivation ceased a large amount of nitrogen and humus would be available to turn under in the spring, which would materially aid in solving the fertilizer problem in the orchard.

The cropped orchards were not sprayed and therefore scarcely give a fair basis for comparison, but the average shows plainly that it does not pay to crop a bearing orchard.

Insects and Disease. Of all the various elements that have entered into the conditions which of late years have discouraged orcharding in this district, insects perhaps are the most serious. Orchards that years ago gave abundant crops, have of late years become unproductive and unprofitable in a way that has been somewhat of a mystery to the farmer and orchardist. Without a close examination the causes of this falling off in productiveness cannot be seen. The old unsprayed sod orchards of the district have become infested with bud moth, apple bucculatrix, cigar and pistol case bearers, to a degree that precludes all possibility of fruitfulness. To the attacks of these insects have been added those of tent caterpillar, fall web worm and green apple aphis, the latter having this year in many cases almost ruined the crop. Against these minute creatures the farmer or orchardist who has not studied modern orcharding is utterly helpless. But by intelligent

application of the information given in the many bulletins on the subject not only can these insects be overcome but orchards that were thought to be past all usefulness can be made to yield handsome profits.

The better known enemies, scab and codling moth, are very destructive in all this district. These pests are especially bad in the southern part of the district and particular care should be given in Lambton and Middlesex to fighting these enemies. On the other hand, while oyster shell bark louse is found in the whole district, it is much worse in the northern sections where in many cases whole orchards are seriously affected by it.

Apple canker is also becoming quite serious in some sections. It is not sufficiently bad, however, to give cause for alarm. In a short time, if neglected, its attacks may spread until it has become as serious as it is in the east. In the northern part of this territory where canker occurs it is found almost invariably in trees affected by sunscald. Now is the time to deal with this disease before it becomes serious.

Sunscald is found almost entirely in trees having an open habit of growth or where they are headed very high and pruned out severely in the centre. Sunscald can be entirely overcome in this district by proper and reasonable methods of heading and pruning.

Spraying. Spraying intelligently done, will certainly control all the orchard insects in the district. The many failures reported where spraying has been tried for a year or two and dropped, tell nothing of the value of spraying, but speak eloquently of the need of intelligent knowledge of spraying and thorough application of spraying mixtures as well as a knowledge of the insects and fungi. the orchardists are attempting to combat.

Only a comparatively small number of those people who are practising spraying are doing the work just at the proper time, or doing it with sufficient thoroughness. There is a proper time to spray, and one spraying done just at the right time does much more good than two or three sprayings done at other times. Doing the work at the right time is a splendid form of labour saving. In spite of the poor spraying practice so general in the district, the following tables give conclusive evidence that it pays to spray, even in a way far from being perfect. In compiling these tables it was found necessary to use sod orchards for comparison. An interesting fact may be noted here. The man who takes the trouble to practise clean cultivation in nearly all cases believes in and practises spraying. For this reason, a sufficient number of orchards subjected to clean cultivation and not sprayed could not be found to compare with those receiving clean cultivation and sprayed. The tables are a comparison, then, of orchards kept in sod, pastured, fertilized and sprayed against similar orchards not sprayed. Neglected orchards were not included in these computations.

Table 2.

Average per acre.	1907		1908		1909		Total No. of	
	Bbls.	$	Bbls.	$	Bbls.	$	Acres	Orchards.
Sod sprayed	38	51	18	22	40	54	252	38
Sod unsprayed	32½	35	16	11	50	44	448	119

The comparatively large number of orchards unsprayed indicates how much this method of increasing the profits from orchards is neglected, and the table shows plainly how much can be gained by spraying. Where spraying is thoroughly done at the right time the value of the crop can be very much increased in an ordinary year.

Fertilizing. The man who has become sufficiently advanced in orcharding to cultivate his orchard, generally fertilizes as well as sprays, but even he does not sufficiently recognize the value of some form of potash and phosphate manures. For this purpose unleached wood ashes are perhaps the best and cheapest form of potash and phosphate fertilizers available. Several men report using commercial fertilizers with excellent results. A more thorough knowledge of the requirements of orchards in order to get the highest degree of fruitfulness as well as a more complete knowledge of fertilizers generally is very much needed by orchardists. Barnyard manure, while being a good general manure, is too rich in nitrogen in proportion to the percentage of potash and phosphates, to give the best results obtainable in orcharding. This is especially true where clover is used as a cover crop, as it, too, is rich in nitrogen.

In cultivated orchards the growing of cover crops should be more generally practised as an easy way of securing a large amount of nitrogen annually. Then, by a judicious use of phosphate and potash fertilizers, along with barnyard manure a high degree of fruitfulness may be obtained.

Even in sod orchards fertilizing is more generally practised than is spraying. Barnyard manure is almost exclusively used. Many orchardists who practise pasturing calves, sheep or hogs in their orchards expect the droppings from these animals to be sufficient fertilizer. They forget that they are taking two crops off the land, *i.e.* one of calves, sheep or hogs, and the other of apples. It has been found that fields subjected to pasture for many years gradually become exhausted, although possibly richer at the surface. The grass in its effort to produce pasture for the animals, robs the orchard of much fertility. Surely then an orchard subjected to pasture requires regular applications of fertilizer.

The appended tables were computed from a list of unsprayed orchards. As in previous tables badly neglected orchards were not reckoned.

Table 3.

Average per acre.	1907		1908		Total No. of	
	Bbls.	$	Bbls.	$	Acres	Orchards.
Sod fertilized	34	35	12	12	192	39
Sod unfertilized	25	28	18	8	193	46

In 1908 the number of barrels yielded by unfertilized orchards is in excess of the fertilized orchards, but even then the number of dollars received was greater in the fertilized orchards as in very many cases orchards unfertilized and unsprayed are forced to market their product to the evaporator. Sufficiently accurate figures on this point were not obtainable to report for this year (1909).

Heading and Pruning. In heading an orchard two main objects should be kept in view: 1. Health of the trees. 2. Ease in handling, *i.e.*, cultivating, pruning, spraying, harvesting. Generally speaking only one feature has been kept in view in

heading orchards, and that is, ease in cultivating. Trees have been pruned up and up with the object of being able to drive a team under them, leaving long bare trunks which in the more tender or "straggly" growing varieties have become sunscalded, cankered and finally killed outright. In many cases this extreme high heading has defeated the very object for which it was intended, as so much light was admitted below the lower limbs that the under limbs began to grow downwards towards the light. When to this method of heading is added a system of pruning that cuts all the centre out of the tree and forces all the fruit to be borne on the tips of the branches, a condition occurs the very reverse of what the orchardist aimed at, namely, ease in cultivating. The tips of the branches are all pulled down toward the ground in such a way as to make it impossible to cultivate.

The common practice of pruning all the middle out of a tree has resulted in two very bad conditions. It has forced the trees to bear their fruit at the tips of limbs, that is at the weakest place. The result has been a breaking down of many trees; in others unnecessary dropping of the branches has been caused. Trees pruned very open in the centre are subject to sunscald with the resultant injury or death of the tree.

Peach trees depend very much for their fruitfulness on a proper system of heading back, and this should be studied by the peach growers of the district as very few are pruning their trees in a proper manner.

Thinning. A very few orchardists are thinning their fruit on the tree. This year (1909) owing to the bunching of the fruit on the trees as a result chiefly of apple-aphis injury, the need was especially great. Many orchards would easily have yielded double the amount of money to their owners if a little time had been spent in thinning. A most remarkable difference could be seen in the orchards of those men who thinned this year as compared with the unthinned orchards. Thinned orchards this year sold at $1.75 per barrel on the tree, as compared with $1.00 for unthinned. Then, when the fact that a thinned orchard yields double the number of barrels of saleable apples, the great gain can easily be reckoned. The cost of thinning, as computed by experienced men is 5c. per barrel. Another important advantage gained by thinning is in securing annual crops. By removing a part of the crop this year, the tree in place of expending all its energies in the attempt to mature its fruit, can expend a part of its energies in forming fruit buds for next year. This argument alone is a convincing proof of the usefulness of thinning.

Harvesting. The manner of harvesting varies directly with the manner of sale. Where orchards are sold outright to the buyer the packing gang very often picks the fruit. In other cases the fruit is picked and piled on the ground from where it is again handled by the packers. The method of piling on the ground is very objectionable as rain or frost may seriously injure the crop before it is packed. When the picking is done by the packing gang in many cases considerable breaking of the trees occurs owing to rough handling.

Selling. There are four systems of selling the apple crop. 1, To the apple buyer; 2, shipping direct to the wholesalers at the point of consumption; 3, to evaporators; 4, through co-operative associations.

The first method is the one usually adoped. In some cases the apples are sold by the orchard on the trees, or are bought by the barrel either on the tree or picked. In either case the buyer usually does the packing.

There are many objections to selling to apple buyers. In many cases the apples pass through four or five handlers before they reach the consumer. This reduces the price of the apple to the producer to such an extent as to discourage the orchard industry generally. Another objection is that the seller is placed in the position of taking what he is offered by the buyer, whereas he should be in a position to place a fair price on his product, and get it. Still another objection is that competition, which is often keen among buyers, causes a flat rate to be paid for all kinds of apples. This discourages those inclined to do so from adopting more modern methods of culture and management.

A word in defence of the apple buyer should be said right here. Many of these men are honestly trying to do their best under the circumstances, and the trouble really lies in the system itself rather than with the individual buyer.

In spite of the discouragements due to bad selling systems, quite a number of men are adopting modern orchard practice and have tried shipping direct to the point of consumption. A fair number of these report reasonable success. Where the grower is alone in his section this is probably the best method of sale. One of the chief objections to it is that unless the sales are made f.o.b. the commission man very often reaps nearly all the profits. A modification of this system is reported as working very well. The grower picks, packs, and stores his apples; then he places a price on them, and sometimes sells to a local apple buyer with fairly good results.

The third method of sale, *i.e.*, to the evaporators, has become quite common in those sections where orchards are generally neglected. This is perhaps the best possible method of selling the poor class of apples produced in such orchards. In some cases the owner of the evaporator ships a certain percentage of these apples and cures the rest. The trouble with this method is that it offers absolutely no encouragement to better methods of production. A flat price is paid for the whole crop, good and bad. The apples are shaken from the trees, and here again poor orchard practice is encouraged. As a means of marketing culls the apple evaporator certainly has a place.

The fourth method, by co-operative associations, is the one that undoubtedly gives best results in marketing all kinds of fruit.

In that part of Lambton County included in this survey there are two of these associations, working under the name of the Forest Fruit Growers' Association and the Arkona Fruit Growers' Association, respectively. A very marked difference is evident in the interest in, methods of management of, and profits received from, orchards whose owners are members of these societies as compared with many others. In those sections where the associations are strong, orcharding is rapidly increasing, and everyone, bankers, tradesmen of the towns, as well as farmers generally, are awakening to the value of fruit-growing as a great wealth-producing factor in the county. A computation has been made of the yields and sales per acre from the better class of orchards sold to buyers as compared with orchards sold through associations. The remarkable difference in the yields shows how much co-operative sales stimulate increased production.

TABLE 4.

Average per acre.	1907.		1908.		1909.		Total No. of	
	Bbls.	$	Bbls.	$	Bbls.	$	Acres.	Orchards.
Sold through Associations.....	53	81	20	42	51	80	103	22
Sold to buyers	26	32	15	13	35	35	972	123

The advantages of co-operative sale are: A large quantity of fruit is placed on the market of a uniform quality and under one brand; an absolute guarantee of quality can be given, which gives the buyer confidence in the goods; sales can be made more directly to the consumer than can be done through the ordinary buyer; in many cases sales are made f.o.b. at the shipping station, thus throwing the risk of transportation on the buyer at the consumer's end; better transportation rates can be secured by acting in concert; good orchard practice is encouraged; even distribution is secured, as the manager has a large quantity of fruit directly under his control, and, by conferring with other co-operative managers, can regulate the flow of fruit into any one market. The seller is also placed in the desirable position of being able to fix a price for his fruit. A combination of all these advantages insures larger net returns to the growers, with the resulting rise in value of property occupied in orcharding.

Evaporators.—Judging by the number in the district, the evaporator business must be a very profitable one. An evaporator is found in nearly every town and village in the whole district. These offer an easy but not very profitable market for the apple crop. In some sections a great many people market their whole crop to the evaporator. The price paid runs in the neighborhood of twenty-five cents per hundred pounds.

Canneries.—There are no canneries in the whole district. The small acreage of canning crops have not been sufficient to induce the establishment of a factory. Of late years, however, the amount of canning crops grown in the district around Arkona in Lambton doubtlessly offer as good investment for capital in this enterprise as does any other section of Ontario. The nearest cannery is eighteen miles east of Arkona, at Strathroy. There is no reason why certain sections of this district should not grow canning crops equal to the best in Ontario.

Yields, Prices and Profits.—In the various tables given the yields and prices received from various methods of handling orchards and selling the apples are shown. These results are now brought under one head in the following table:

Table 5.

——	1907.		1908.		1909.		Average yield in bbls. for 3 years.	Average prices per acre for 3 years.	Average prices per bbl. for 3 years.	Total No. of	
										Acres.	Orchard.
	Bbls.	$	Bbls.	$	Bbls.	$		$ c.	$ c.		
Cultivated, sprayed and fertilized ...	50	124	32	57	51	76	44.5	85 66	1 93	147	29
Sod, fertilized, sprayed, pastured	37.5	54	18.5	21.5	38	54	31.3	43 00	1 38	238	36
Cultivated, grain crop	21	29	6	6	16	16	14.3	13 66	0 95	64	11
*Sod, sprayed, fertilized	38	51	18	22	40	54	32	42 33	1 32	252	38
Sod, unsprayed and fertilized	32	35	16	11	50	44	32.66	30 00	0 92	448	119
*Sod, fertilized, unsprayed	34	35	12	12	.....	....	23	23 33	1 01	192	39
†Sod, unfertilized, unsprayed	25	28	18	8	.....	....	21.5	18 00	0 84	193	46
Sold through associations	53	81	20	42	51	80	41.3	67 66	1 64	103	22
Sold to buyers	26	32	15	13	35	35	25.3	26 66	1 06	972	123

* Different groups of orchards from the ones above. Compare the two.
† Results for two years.

The consistency of the above figures is remarkable. In working out the tables it was necessary in order to have a fair comparison to use different groups of orchards handled in the same manner. The close resemblance of these figures proves their truth in an undoubted manner. Take for instance the two groups of sod orchards, both sprayed and fertilized, and note the close relation existing between these figures throughout. Likewise in sod orchards unsprayed but fertilized the relation existing between the two groups is very remarkable, although there is a great difference in the acreage and number of orchards.

This table brings out very clearly the effect on the price received per barrel through different methods of orchard management. These, arranged in order of price, give the following:

Cultivated, sprayed and fertilized	$1.90	per bbl.
Sod, fertilized, sprayed and pastured	1.40-1.30	" "
Sod, fertilized, unsprayed	1.00- .93	" "
Cultivated, cropped, unsprayed, fertilized	.93	" "
Sod, unfertilized, unsprayed	.88	" "

Not only do proper methods of management give increased yields, but it is evident from the above figures that they materially increase the price per barrel.

Transportation.—A glance at the map will show that much of the best situated fruit land of this district is very poorly supplied with railways. Apples, being a bulky product, cost heavily for transportation, and where the distance from a railway is great the cost of hauling eats up the profits from the orchard. There is also a serious lack of really good harbors on the lake shore, thus making good land transportation absolutely necessary to rapid development in orcharding. That section of country from Port Elgin to Sarnia should offer excellent opportunity for an electric power line. As this district develops into fruit, population must increase, with a resultant increase in railroad traffic. An electric power line is now being built from Kincardine to Goderich. The greatest acreage of orchards in a block in the County of Huron lies south of Goderich, and it must be only a question of time until this section is supplied with good transportation facilities. A few months ago a Goderich paper published a proposed plan of an electric line for the county. These proposals should receive the careful consideration of every landowner and fruit grower in the district, as there is no doubt that the low price of land and the lack of advancement in orcharding is largely due to poor transportation facilities. Competing lines of railroad in this district would also make the railroads now in existence there a little more desirous of giving good service than they are at present. One large shipper made the following statement: "Cars of apples to be forwarded by boat, loaded at Tara, within twenty-five miles by rail of Owen Sound, were sent to Sarnia, and allowed to lie three weeks at the docks before being loaded on the boat." Many similar complaints have been made, and it would seem imperative that some steps should be taken to induce the railroad companies to give more prompt and direct service. It is surprising, with the large amount of fruit grown, the numbers of cattle, swine, horses, etc., raised, and the large and increasing popularity of many places on the shore line as summer resorts, that this district is so inadequately supplied with railways.

Markets.—The district is favorably situated to reach the western and northern markets, as well as those of Europe and the Old World. The co-operative associations and a few private individuals have shipped successfully for some years to Britain and the West. Peaches and tender fruits are usually shipped to

such towns as Sarnia, London, Stratford, Chatham, Guelph, Toronto, and Sault Ste. Marie, and find there a fairly good market. There are, of course, unlimited opportunities in the distant markets.

Population.—The movement westward has greatly affected this whole district. This is especially noticeable in those townships where little fruit has been planted. There the farms have increased in size so much that scarcely one-half of the houses are occupied. In some sections not more than forty per cent. of the population that existed twenty years ago is to be found to-day. On the other hand, in the sections where much fruit is planted, the increase in the size of farms is not nearly so noticeable, empty houses are fewer, and population generally is much more dense. It would seem that the movement westward began to take place about the same time that European markets became available for Canadian fruit, with the result that those sections which already had considerable fruit began to plant more and thus created conditions which vied in attractiveness with the inducements of the West. The following table shows population from 1880 to 1909. Note the continuous decrease in every case:

Table 6.

Dates.	Lambton.			Huron.						Bruce.		
	Plympton.	Bosanquet.	Warwick.	Hay.	Stanley.	Colborne.	Hullett.	W. Wawanosh.	E. Wawanosh.	Huron.	Bruce.	
1880.....	4,197	2,896	3,700	3,375	2,373	1,875	3,378	1,894	2,329	5,175	4,236	
1885.....	4,000	2,717	*	3,422	.....	.....	.....	1,902	2,110	.....	.....	
1890.....	3,668	2,498	.....	3,440	.....	2,083	.....	.....	1,932	3,612	3,371	
1895.....	3,636	2,435	.....	4,045	.....	1,791	.....	1,844	1,856	3,645	3,084	
1900.....	3,242	2,448	2,329	3,452	2,152	1,530	2,898	1,831	1,933	3,308	3,492	
1905.....	3,252	2,606	.....	3,295	.....	1,679	.....	.....	1,755	3,039	2,719	
1909.....	3,134	2,466	2,662	3,167	1,788	1,450	2,475	1,795	1,619	2,907	2,357	Total.
Decrease in 29 years..	1,063	230	1,038	208	585	425	903	99	710	2,268	1,879	9,408

* For the years left blank, information could not be obtained.

Land Values.—The value of land varies greatly with the proximity to transportation facilities. Good, drained farm land, including good buildings, can be readily bought for from $40 to $70 per acre. Land set in fruit varies greatly with the condition of the industry. In Goderich Township, Huron County, a farm of 120 acres, with fair buildings, and having forty acres of seventeen-year-old apple trees in good condition, was sold in 1908 for $9,500. This was considered an exorbitant price by the people of the township. In this district fruit-growing as a distinct line of agriculture is just beginning to attract attention. In Lambton County, at the same time, where orcharding is commanding general attention, land set in bearing orchard has been assessed as high as $130 per acre. The difference in price has been chiefly brought about by the adoption of scientific orchard practice and modern co-operative methods of sale of fruit.

The following table gives values, areas of townships and acreage of orchards, etc., from eleven townships in the district, as nearly as they could be supplied by them.

TABLE 8,

County.	Township.	Area in Acres.			Assessment Value.	
		Total.	Tilled Land.	Orchard.	Farm Land per acre.	Total in Township.
					$ c.	$
Lambton ...	Plympton.....	75,015	56,075	2,846	27 00	2,405,607
" ...	Bosanquet	71,000	.....	.....	30 00	2,168,366
" ...	Warwick	70,000	56,554	.....	32 00	.....
Huron.....	Hay.....	52,487	43,457	376	35 00	2,345,420
"	Stanley.....	43,347	37,834	.....	.....	1,525,305
"	Colborne.....	34,133	30,952	.....	35 00	1,379,750
"	Hullet.....	53,468	45,869	530	37 00	1,980,000
"	West Wawanosh.....	42,000	20,585	.....	35 00	1,303,956
"	East Wawanosh.....	41,732	30,323	.....	39 00	1,636,375
Bruce	Huron	58,104	54,096	550	30 00	2,590,972
"	Bruce	67,183	51,741	399	21 00	1,839,862

NOTE.—Figures of orchard acreage could not be obtained for several townships.

POSSIBILITIES.—The future of this district lies entirely in the hands of its people. Nature has done her part and done it well. In geographical situations and topographical features everything is favorable for fruit growing. In some sections drainage is essential to good results, but with proper management these sections can produce fruit of very superior quality. Apples can be grown successfully without fear of winter injury in almost any part of the district included in this survey. The finest commercial varieties—Baldwin, Spy, King, Greening, Gravenstein, etc.—flourish and grow to perfection in all this district. Northern apples excel all others in quality, and there are orchards in this section whose amount of production it would be hard to beat. Winter injury is practically unknown in the whole district, except in a few small sections and even here it is simply a matter of proper management.

It would seem from observation of peach orchards growing at the present time in Lambton County that there is a considerable section there quite capable of producing the finest peaches of almost any variety grown in Ontario peach districts, and comparing favorably in fruitfulness with the Niagara district. The clay loams, which are the predominating soils, are very well suited for plums and pears, and these, particularly the former, do very well wherever planted on such soils. Grapes are also grown with great success, though on a very small scale.

In the opinion of the writers the future horticultural possibilities of this section can scarcely be exaggerated. The essentials for the horticultural success of a district, apart from the right kind of men, are good natural conditions, good markets, sufficient labor, and a proper selling system. The latter is being admirably supplied by co-operation. It is the experience of many growers that labor can easily be got if enough is paid for it, and also that labor, almost at any cost, properly directed in orcharding, pays for itself over and over again. With the increase of fruit-growing, too, labor will become more plentiful, because it goes where it is wanted.

Markets are practically unlimited and improved transportation is a matter of time. There only remains natural conditions, and these, as has been pointed out, are very favorable. Much has still to be done, but the future is undoubtedly great.

ORCHARD SURVEY OF PRINCE EDWARD COUNTY.

By W. H. Robertson.

Purpose. This survey was similar to that conducted in other counties of the Province of Ontario and in various States of the Union. The object was to obtain definite information regarding the present horticultural situation in Prince Edward County, as shown by the acres in bearing and non-bearing orchard, care and management received, prices obtained, as well as other facts of interest from a horticultural standpoint.

Method. Being supplied with notebook and blanks similar to those used on other surveys, a farm-to-farm canvass was made. The blanks when filled out would convey the following information regarding each orchard, viz.—The name and post office address of the owner, together with the number of the lot and concession where the farm was situated, as well as the name of the county and township; the number of acres in the farm, acres in fruit, kind of fruit, number of bearing and non-bearing trees and acres of each; the site of the orchard, as well as the aspect, planting plan, distance apart of the trees and varieties grown; whether or not other crops were grown in the orchard, and if so the nature of the crop: nature of the soil, depth and kind of subsoil; regarding tillage, the kind and frequency was noted, whether or not cover crops were grown, and if so for how many years. If in sod the kind was noted, number of years this method had been followed and the manner in which it was treated; fertilizers, kind, quantity used and frequency of application; pruning, times, method followed, frequency and severity as well as the thinning of the fruit if this practice is followed. Diseases were noted, as well as the various insect pests, and also the present condition of the orchard visited. The manner of selling was obtained, as well as the yields and prices for the three previous years, together with the income per acre and the manner in which the apples were packed, viz.; boxes or barrels.

As the farmers on the whole are not very careful book-keepers, it was impossible in many cases to obtain satisfactory information, especially in the cases of yields and prices obtained.

Geographical Situation. Prince Edward County is situated on the Northern shore of Lake Ontario and about one hundred miles east of Toronto. The county is almost surrounded by water, being connected with the mainland at the western extremity by a narrow strip of land. Through this strip of land, however, runs the Murray Canal, which makes Prince Edward County practically an inland. The county is divided into seven townships, namely; Ameliasburg, Sophiasburg, Hallowell, North and South Marysburg, and Athol. It was in the township of Hallowell that the orchard survey was carried on this summer. This township has an area of 43,707⅞ acres of assessable property, and is situated in what might be said to be the very centre of the county when compared with the other townships. It is bounded on the North by the township of Hillier and Sophiasburg, on the South by the townships of Athol and North and South Marysburg. On the East by the township of Sophiasburg, North Marysburg and also the Bay of Quinte, and on the West by the township of Hillier and Lake Ontario.

Topographical Features. Enclosed within this township is a body of water known as West Lake, and covering an area of at least four thousand acres,

and at no point in the township is there a place situated over five miles from the waters of either Lake Ontario or West Lake. The contour of the county on the whole is varied. East of the town of Picton and extending along the east side of Picton Bay and for about one mile south of the town is a high plateau-like formation. The soil here is of a clay-limestone-gravel formation. For the most part it is very shallow, probably not averaging over four feet in depth and very little fruit is grown here. The remainder of the township is, for the most part, a gently rolling country. The soil is varied. North of the town of Picton it is of a clay loam formation, with here and there streaks of clay-limestone-gravel. West of the town and extending to the village of Bloomfield the soil is a sandy loam, with patches of what is known as black loam or "Black Land" situated in the hollows and lower portions. South of Picton and extending west along what is known as the "Ridge Road," the soil near the town is very light and sandy, gradually changing until it reaches the character of a light sandy loam. South of West Lake the soil near the shore is of a light sandy nature, and changing to sandy loam and finally clay loam as we recede from the shore. North of West Lake and including the first concession the soil is for the most part clay loam. North of the first concession the soil is principally of the clay-limestone-gravel formation. The soils for the most part are of sufficient depth to insure good orchard growth, with the exception of the clay-limestone-gravel. Where this is found the soil is for the most part too shallow to insure sufficient growth and very little tree planting has been done.

Drainage. The county, as before mentioned, is of a gently rolling nature and the drainage on the whole is fair. The orchards in most cases are situated on the highest parts of the farm and as a rule the trees do not show a lack of drainage. When drainage is used, the system employed principally is the open ditch. Up to the present time, there has been no tile drainage done in the orchards and very little on the farms in general. Much of the land could, however, be greatly improved by tile drainage and a few are beginning to see the advantage to be derived and are laying tile. Needless to say, they are in the minority. The advantages to be derived from the tile drainage are numerous, chief of which are the facts that it allows an earlier seeding in the spring, and also allows heat, and air to enter the ground, both of which are necessary for seed germination.

Climate. Surrounded as it is by so much water, it naturally follows that there is little tendency towards extremes of either heat or cold. Regarding correct data on this question of temperatures, none could be secured. In the township of Hallowell, however, the winter temperature rarely falls below minus 10 degrees to minus 15 degrees, although it has been known to fall as low as minus 30 degrees. This is rare, however, and the low temperature would probably be between 0 degrees and minus 5 degrees. These temperatures are by no means prohibitive of fruit growing, and it was only during the winter of 1903 and 1904 that fruit trees in this section suffered at all from the extreme cold. The summer temperatures on the whole are not extreme, and there is usually sufficient fall of rain to prevent trees suffering from the drouth. Especially is this noticeable in orchards that have been cultivated.

Extent and Present Condition of the Industry. Having an area as it does of 43,707⅞ acres; 36,826 acres of which is cleared and for the most part suitable for cultivation, the acreage in fruits is not very large. At the present

time, there are 1,562 acres in apples. Of the amount, 941 acres are bearing, while the remainder comprising 621 acres is non-bearing. The trees bearing at the present time number 51,623; those non-bearing number 27,075. From these figures it may be seen that the average number of trees per acre of bearing orchard is 54.8, while for the non-bearing orchard it is 43.5 trees per acre.

TABLE 1.

No. of acres suitable for cultivation	36,826 acres	100 %
No. of acres devoted to apples	1,562 acres	4.2%
No. of acres of bearing apples	941 acres	60.2%
No. of acres of non-bearing apples	621 acres	39.7%
No. of bearing apple trees in the township		51,623 trees
No. of non-bearing trees in the township		27,075 trees
Average No. of bearing trees per acre		54.8 trees
Average No. of non-bearing trees per acre		43.5 trees

Apples are the principal fruit grown, there being practically no commercial planting of pears and plums. Cherries are not grown to any extent. There are, however, a few commercial orchards that are doing fine. Sour cherries are the principal kinds grown and the Montmorency and Early Richmond comprise the largest plantings. The principal cherry orchards are planted on a clay-limestone-gravel, and on this soil they do remarkably well, as it is hard and gritty and seems to be particularly suited to their growth.

For apples, the clay-limestone-gravel does not seem to be so well suited. This is due, no doubt, to the fact that it is difficult to secure sufficient depth of soil to insure a satisfactory growth. Where it can be secured, however, of sufficient depth, the trees do well. The part of the county where the principal apple orchards are found is in the vicinity of Picton and in close proximity to the county road, between Picton and Wellington. A great deal of the remainder of the county is suited to fruit growing. In most cases, however, fruit growing is a secondary proposition only receiving attention, if at all, after all other crops have been attended to.

From the following table, some idea may be obtained of the comparative yield of the orchard with other farm crops.

TABLE 2.

Crop.	Fair yield in bus.	Price.	Value.
		$ c.	$ c.
Fall Wheat	30	98	29 40
Barley	34	53	18 02
Oats	45	40	18 00
Peas	20	2 00	40 00
Beans	20	2 00	40 00
Potatoes	150	50	75 00
Tomatoes	300	25	75 00
Apples	200	40	80 00

It was impossible to obtain accurate information on the number of trees of each variety, and in the case of the older bearing orchards the age of the trees. The varieties in the older orchards are very badly mixed and many worthless kinds are found. More attention was paid, no doubt, at the time of planting to securing a variety of fruit for home consumption rather than for commercial pur-

poses. The older orchards are for the most part small and do not receive the attention that they should. The young orchards on the whole receive better attention than the old orchards. The trees are set farther apart and in many cases interplanted with such canning factory crops as corn and tomatoes, thus increasing cultivation in the orchard. Very little attention is given to the spraying or the pruning of the young orchard for the first year or two at least. This results in a bad head being formed and much harm being done through the attacks of such insects as the Oyster Shell Scale and the Case-Bearer. The varieties in the non-bearing orchards are numerous. The Ben Davis, Stark, and Spy are without doubt the leading varieties, while among the others planted are the McIntosh Red, Cranberry Pippin, Pewaukee, and Wealthy. These are a few of the more important. There are others too numerous to mention, as the grower has not yet learned that it will pay him better to set out two or three standard commercial varieties instead of an orchard containing a number of varieties.

At the present time, the interest of the farmers is being awakened in fruit growing. In many cases the older orchards are being scraped and spraying is being done, although not always in the most satisfactory manner. Pruning, when attempted, is in the majority of cases by no means thorough, and the general indications are that in the future more attention will be given to the production of first class fruit.

From the following table some idea of the distance between trees may be obtained.

TABLE 3.

Distance between Trees.	Number of Acres.	Percentage.
Under 25 x 25 ft.	99	6.338
25 x 25 to 29 x 29 ft.	172	11.011
30 x 30 to 35 x 35 ft.	1,092	69.916
36 x 36 to 40 x 40 ft.	136	8.706
Other distances	63	4.037

From the above table we may see that 69.916 per cent. of the trees are set at a distance varying from thirty feet by thirty feet to thirty-five by thirty-five feet.

The plan usually adopted for planting is the square, very few orchards being planted on any other plan. In the very old orchards in several cases, little attention has been paid to planting and the trees are more or less irregular.

NURSERY STOCK. At present, the stock for planting is principally Canadian grown, although a small quantity is obtained from the United States. More attention should be paid by the growers to the obtaining of first-class stock. Much of that which is planted at the present time is very high-headed and in many cases the trees when obtained from the nursery are bruised and broken.

SOIL MANAGEMENT. The methods of soil management differ greatly. The two principal methods are (1) Sod culture, (2) Cultivation. In the sod culture, the usual plan is to allow the orchard to remain in sod, pastured by horses, cattle or hogs. As a rule, the man who pastures his orchard is neglectful, and the orchard is not kept in first-class shape.

When cultivation is followed, the orchard is either fall or spring plowed, and kept cultivated through the summer and in some cases planted to a cover crop.

In the young non-bearing orchards the usual plan is to plant a hoed crop of some kind, such as tomatoes or corn, and keep these cultivated through the summer. The principal cover crop grown is buckwheat. In some cases rye and clovers are used. Clover as a cover crop should be more extensively used, as it not only aids in adding humus to the soil but also from the fact that it collects large quantities of nitrogen from the air, which is made available to the tree when the clover is turned under.

Insects and Diseases. The insects and diseases that attack the fruit and foliage of the orchard trees are numerous. It is probably in a large measure due to these pests that more interest is not taken in the production of fruit, and it is the reason why more fruit of a first-class quality is not produced. With the present knowledge, however, of sprays and the best method of application, there is little excuse for the production of poor fruit. The insects and diseases that are troublesome are numerous but there are many methods of combatting them. To give them any more than a passing notice in this publication would be impossible. Nevertheless, it might be advisable to mention a few of the most serious ones which have been encountered in this survey.

Insects.

Oyster Shell Scale. This is without doubt one of the most serious insect pests that can be found to-day in Prince Edward County, and I feel quite safe in stating that ninety-nine per cent. of the orchards visited are infested with this insect. The remedy is simple, being the thorough application of lime and sulphur spray before the leaves open in the spring.

Blister Mite. Another serious insect pest and one which is not as well known to the grower as the Oyster Shell Scale, is the Blister Mite. These insects are very small, too small to be seen with the naked eye. They raise on the leaf small blisters which eventually turn brown, and in this way destroy the function of the leaf. The remedy for this insect is similar to that for the Oyster Shell Scale, namely, a thorough application of lime and sulphur spray before the leaves open.

Railroad Worm. This insect attacks the fruit during the month of August, and is one of the most difficult to control. The adult lays its eggs under the skin of the apple. The larvæ when hatched bore through the fruit in all directions. The principal remedy, and one which has given great success, is to destroy all infected fruit. This may be done by picking up all the fallen fruit and feeding it to the hogs or by burying it deeply in the ground.

There are also other insects which are numerous and doing a great deal of damage. The most harmful ones are: Codling Moth, the Apple Tree Tent Caterpillar, the Case-Bearers, and the Tussock Moth.

Diseases.

The diseases encountered on this survey which affect the fruit and trees are not numerous. Nevertheless, they are of such a nature that more attention should be given to their treatment than is done at the present time.

Black Rot Canker. This disease is found principally in the old orchards, although the young orchards are by no means free. At the present time fully

ninety per cent. of the orchards visited are troubled to a greater or less degree with this disease. The principal remedy is to cut all infected spots in the tree. Then disinfect thoroughly by washing with corrosive sublimate solution. When thoroughly disinfected, paint with a mixture of white lead and oil. This treatment not only cleans out the wound and allows it to heal, but also prevents further infection.

Other diseases which were quite prevalent were the Leaf Spot and Apple Scab. Both of these can be overcome by thorough spraying with lime and sulphur.

Collar Rot. Collar Rot was noticed in a number of the orchards. The first appearance of the trouble is the rotting or decaying of the bark around the base of the trunk, which results in the death of the tree. The cause of this trouble is not definitely known. Treatment similar to that for Black Rot Canker would no doubt prove beneficial.

Spraying. Spraying is an orchard practice which is receiving more attention at the present time than formerly. This is no doubt due to the fact that the fruit grower is troubled with more insects and diseases than was the case in previous years, and he is beginning to see that if he intends to make his orchard pay he will have to spray. The character of the spray used is varied. The old spray known as Bordeaux Mixture is used much less than formerly, its place being taken by the lime and sulphur washes, which are proving very satisfactory. In some cases preparations of Gillett's lye have been used. This is not satisfactory, as the amount required renders it too expensive for commercial work.

Although more spraying is being done than formerly, there is still room for improvement in the manner of spraying. To be satisfactory and profitable, it must be done thoroughly. The lack of thoroughness is one of the points of spraying that is in need of emphasis, and until the grower learns to spray, and spray thoroughly, he cannot expect his crop to bring him satisfactory returns.

At the present time the form of spraying machinery most generally used is the barrel pump. Another kind of outfit used, although not to any great extent, is a two-barrel tank. The power in this case is supplied by the revolution of the wheels. No sprayers were seen during the survey where the power was supplied by means of a gasoline engine.

With regard to the kind of spraying outfit which would prove the most satisfactory it is difficult to say. The man with a smaller number of acres of fruit will not require as large an outfit as the man with a large orchard. Whatever kind of spraying outfit is used, it should be of sufficient power to generate and maintain at least one hundred pounds pressure, this amount of pressure being necessary to give a satisfactory spray.

Table 4.—Results of Spraying, Cultivating, Fertilizing.

Treatment.	1908.		1909.		Total Number of	
	Barrels.	Value.	Barrels.	Value.	Acres.	Orchards.
Sprayed, cultivated, fertilized	31	$39 68	32	$46 28	58	9
Not sprayed, cultivated, fertilized	15	20 28	17	15 81	53	11

TABLE 4.—SPRAYING IN 1910.

How Sprayed.	Number of Orchards.	Number of Acres.	Per cent.
Sprayed once 1910	15	145	30
Sprayed twice 1910	25	314	50
Sprayed three times 1910	10	121	20
Total 1910	50	580	22.527
Seldom or never sprayed	172	982	77.675

TABLE 5.—KINDS OF SPRAY USED FOR SUMMER SPRAYING IN 1910.

How Sprayed.	Number of Orchards.	Number of Acres.	Per cent.
Lime and sulphur	25	254	50
Lime and sulphur and arsenate of lead	13	201	26
Bordeaux mixture and Paris green	1	25	2
Paris green only	1	3	2
Bordeaux only	3	31	6
Lime and sulphur and arsenite of lime	1	25	2
Other mixtures	6	41	12

FERTILIZATION. The subject of fertilization is one of the most important problems that the orchardist has to deal with. That the trees are taking food out of the ground from the time they are set until the tree dies is an assured fact. For this reason, therefore, there should always be sufficient fertilizer in the soil to insure a healthy growth. Just how much plant food is taken up by apple trees as compared with various field crops may be seen from the following table taken from Bulletin No. 68 of the Illinois Experiment Station.

TABLE 6.—FERTILIZING CONSTITUENTS USED BY APPLES AND FARM CROPS.

Produce.		Pounds.		
Kind.	Amount.	Nitrogen.	Phosphorus.	Potassium.
Oats.... Grain	75 bus.	45	7	9
Oats.... Straw	2 tons	24	4	40
	Total crop...	69	11	49
Oats.... Grain	40 bus.	46	6	11
Oats.... Straw	2 tons	19	4	34
	Total crop...	65	10	45
Timothy	2 tons	48	6	47
Potatoes	300 bus.	63	13	90
Apples	600 bus.	47	2	57
Leaves	4 tons	59	7	47
Wood growth	.....	6	2	5
	Total.....	112	11	109

From this table it may be seen that fertilization is as necessary for production in the orchard as in any other part of the farm.

Barnyard manure is the principal fertilizer used. Even the men who do not spray or work their orchards apply barnyard manure to a greater or less extent. Commercial fertilizers are seldom or never used, and the general opinion is that they are of little use. This idea no doubt will predominate until the grower has been taught and shown the way to supplement his applications of barnyard manure with commercial fertilizer. Barnyard manure makes a very good fertilizer. Its chief constituent, however, is Nitrogen; the other two elements which are in many cases very essential are, to a large extent, lacking, namely, Potash and Phosphoric Acid. These two constituents may be supplied by means of wood ashes and commercial fertilizers. Unleached wood ashes form a valuable fertilizer if they can be secured at reasonable cost and in good condition. With regard to commercial fertilizers their value lies in the fact that through them can be supplied at once any constituent in which the soil is lacking, and also that they are readily available to the plant. The commercial fertilizers may be divided into three classes, viz.: (1) The Nitrogen-supplying fertilizers, such as Nitrate of Soda, Blood, and Guano; (2) the Potash-supplying fertilizers, such as Kainit, Muriate of Potash, Sulphate of Potash; (3) the Phosphoric-supplying fertilizer, such as Basic Slag, Tankage. Fish, etc.

Under the head of fertilizers should come cover crops. Not only do they serve the purpose of winter protection, but they also tend to improve the physical and chemical condition of the soil. The cover crops principally used in this district are Buckwheat and Clover. The buckwheat is usually sown about the middle of July. It grows until early in the fall, forming a thick covering, and remains on the ground all winter, being plowed under in the spring. Clover is usually sown in the spring along with some grain crop. The following year a crop of clover is removed from the ground, and the second crop is plowed under. This is rather a questionable means of securing fertility, as the grain crop removes a large quantity of plant food from the ground. By plowing under the first crop of clover a greater amount of humus would be obtained, as well as a large amount of nitrogen.

Cover crops may be divided into three classes, viz.: (1) Those sown for their nitrogen-supplying qualities, as clovers and vetches; (2) those sown for their potash-supplying qualities, such as turnips and rape; (3) those sown for their humus alone, such as buckwheat, rye, and other crops.

Heading and Pruning. The trees in the orchards visited are for the most part headed very high, the principal object being to secure a tree which will not interfere with cultivation. This has been accomplished in many cases without regard for securing a tree that may be easily sprayed, pruned or picked, which would be the case were they headed lower.

With regard to pruning, the main idea should be to open up the tree in such a manner as to let in sunlight, so as to insure a good coloring of the fruit, a minimum amount of disease, and a maximum amount of value from spraying. It also takes a less amount of spray to cover a tree that has been well pruned than one resembling a brush heap. Thus it appears that good pruning and thorough spraying must necessarily go hand in hand. There are two systems of pruning to be followed, viz.: Open centre and central leader. In the majority of cases in this district little or no attention has been paid to any system. When followed up, the main idea seems to be to get rid of dead wood and suckers and to trim the branches

in such a manner that the bearing wood is all on the outside. This leaves the main limbs long and bare, the weight of the fruit being all on the ends of the limbs, making propping necessary; if not done, the result is the breaking of the limbs. When pruning is done, in many cases not enough attention is paid to the manner in which the cuts are made. Growers often think that once the limb is removed the operation is finished, and no more attention is given to the wound.

Pruning is usually done in the early spring, because at this time the grower usually has more time to devote to this work than later in the season. A few of the growers, however, attempt June pruning, which is no doubt a good time if opportunity offers.

Thinning. Thinning of the fruit in the early stages in order to increase size and quality has been attempted. Most of the growers think that it is a waste of time. In one case, however, where thinning was done, the results obtained were excellent, and they would have been much more satisfactory had the operation been a little more severe. Not only does thinning tend to increase the size of the fruit, but it also tends to the production of an average crop each year. There is thus no overloading of the trees and permanent injury caused by breakages.

Harvesting. The manner of harvesting depends largely on the method of selling. If the orchard is sold directly to the buyer, it is his men who do the picking. As soon as the apples are picked, they are carried to the grading table. Here they are sorted into the various grades and packed into barrels ready for shipment. (At the present time, none of the growers have learned the art of box packing, so that no shipments are made in boxes, either by the growers or buyers.) All packing is done in the orchard, and from the orchard they are drawn to the station and shipped. Few or no barrels are placed in storage in the township.

Methods of Selling. The principal ways in which apples are sold are: (1) Co-operatively; (2) On commission; (3) To the buyer; (4) Canning factory and evaporators.

Up to the present time there have been no apples sold by a co-operative society. The first co-operative association, namely, "The Prince Edward Fruit Growers' Association," was formed during the spring of 1910. Their object was to purchase the various supplies for their members but not to sell their fruit. They intend, however, in the near future to control the selling of the fruit also. A word with regard to the value of co-operation would not be out of place. Not only does it enable the fruit growers to purchase their supplies at a reduced cost because of the fact that these are bought in bulk, but it also enables them in packing their fruit to put large quantities of a uniform quality on the market. Better prices are thus obtained and better rates are often secured from the railways by the company than could be secured by the individual.

Few of the growers ship their apples on commission. When this is done, it is usually to Ottawa, Montreal or England that they are sent. The prices obtained are as a rule very satisfactory, but so few of the growers have followed this method that it is difficult to say whether satisfactory results would follow if it were largely practised. Results will, of course, in any event depend entirely upon the grade of fruit packed, as well as upon the honesty of the commission man, as the grower is largely at his mercy once the fruit has been shipped.

Selling the fruit to the apple buyer is the method most largely practised. There are, however, different methods. The buyer may visit the orchard during

the summer and offer him so much per barrel on the tree for firsts and seconds, or it may be that the buyer buys at so much per barrel orchard run. Again, the buyer may give the grower so much for the orchard. In some cases the growers pick and pack their own fruit, and then sell to the buyer whenever he wishes. This last method is, I would say, the most desirable. The grade of apples should be superior, while the grower would also be more careful in picking not to injure his trees. A number of the growers also sell their fruit to the factories and evaporators. This includes the culls and a poorer class of fruit generally than that which is packed and sold by the barrel. The quantities which the factories will take for canning purposes is limited. The evaporators, however, will probably take a fair amount, but as to the exact quantity I am unable to say. The factories also buy a large quantity of the strawberry crop. As these two crops, however, are not grown in exceedingly large quantities, they were not considered to any extent in this respect.

TABLE NO. 9.—HOW THE FRUIT IS SOLD.

Total.	On commission.		To buyer.		Factory and evaporator.	
193 growers...	10	5.18%	165	85.4%	18	9.3%

TABLE NO. 10.—RETURNS FROM DIFFERENT METHODS OF SELLING.

	1908.		1909.		Total No. of	
	Bbls.	Price per bbl.	Bbls.	Price per bbl.	Acres.	Orchards.
Canning factory and evaporator	.....	.....	657	$ c. 99	75	11
On commission.	391	2 55	335	2 53	23	4
To buyers on the tree	5,027	1 23	5,754	1 13	255	39

TRANSPORTATION. Surrounded as it is by water, transportation by this means plays an important part. Through the summer and early fall months part of the shipments of fruit goes by this route to such markets as Toronto, Kingston, Gananoque, and Montreal. This is especially the case in the shipping of small fruits, such as raspberries, strawberries, cherries. The only railroad in the county is the Central Ontario Railway. This line forms the connecting link between Picton and Trenton Junction on the main line of the Grand Trunk Railway. Situated on this line also are the towns of Wellington and Bloomfield. No point in the township is over six miles from the railway, so that we may say transportation facilities are, on the whole, fair.

POPULATION. The following table shows the total population of Prince Edward County and the decrease in population which the county has undergone the last thirty years. The exodus of the people of Ontario in general to the West, and also to the large cities and towns, as well as to the United States, has in all

probability had to do with the depletion of the population of the county. The increase in population of the villages of Bloomfield and Wellington is no doubt due to the fact that many of the farmers are leaving the home farm and retiring to the city. The establishment of canning factories at these points would also have the effect of bringing more people into the villages.

PRINCE EDWARD COUNTY.

Dates.	Townships.										
	Ameliasburg.	Athol.	Hallowell.	Hillier.	Marysburg N.	Marysburg S.	Pictontown.	Sophiasburg.	Wellington Village.	Village of Bloomfield.	Total.
1881	3,451	1,573	3,704	2,192	1,700	2,205	2,975	2,546	598	.....	21,044
1891	3,079	1,284	3,380	1,890	1,430	1,643	3,287	2,341	555	.....	18,889
1901	2,585	1,187	3,445	1,647	1,213	1,342	3,698	2,095	652	.....	17,864
1905	2,430	997	2,892	1,342	1,097	1,142	3,722	1,632	668	.....	15,922
1906	2,429	1,101	2,979	1,281	1,042	1,102	3,834	1,657	681	.....	16,106
1907	2,493	1,059	2,352	1,326	976	1,063	3,780	1,649	760	592	16,050
1908	2,517	943	2,485	1,446	1,010	1,140	3,732	1,598	769	645	16,285
1910	2,389	996	2,418	1,451	1,010	1,028	3,532	1,903	845	647	16,221
Decrease	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4,823

LAND VALUES. Land values vary in this township as well as in any other part of the country. They depend greatly upon the proximity of the land to a town or village, which is really the shipping point. At the present time the value of land along the main road between Picton and Wellington is in the neighborhood of one hundred dollars per acre. Passing out into the country from points along this road, the land may be obtained at different prices, all depending upon the distance from town, nature of the land, and the condition of the buildings. On the whole, the price of land is not exorbitant throughout the township.

POSSIBILITIES. Prince Edward County, like many other counties, is just awakening to the fact that it is capable of producing fruit of a first-class quality. The apple is the principal fruit grown, and when the orchards are looked after the results obtained are excellent. Pears and plums are grown in such small quantities that they were not considered. Cherries are grown in small quantities, but with considerable success. Two orchards visited during the survey were doing fine, having made an excellent growth and looking well. Smaller fruit, such as strawberries and raspberries, are grown in small quantities, and their sale is largely to the canning factory.

From the previous statement with regard to topography and transportation it may be seen that the county is well situated with regard to markets, and that the means of transportation both by water and land are on the whole fair, and will improve as time and necessity demand it. On the whole, the outlook for fruit growing in Prince Edward County is very favorable, and this important industry will without doubt increase in extent as the people awaken to the possibilities at hand.

CANNING CROPS OF HALLOWELL TOWNSHIP IN PRINCE EDWARD COUNTY.

By J. E. Smith.

Introductory. Prince Edward County has long enjoyed an enviable reputation for the production of canning crops on a commercial scale. Though with the smallest area of any of the counties, yet to-day it provides the raw material for fifteen out of the fifty-seven canning factories in this Province, with a corresponding percentage of the total annual pack. That part of Prince Edward comprising Hallowell Township contributes approximately seventy-five per cent. of the total output for the county, and it is the purpose of this article to give as clearly as possible an insight into the conditions of the industry as I have found them in that township.

The field work for this report was carried out largely by W. H. Robertson, who in March last was appointed by the Fruit Division of the Ontario Department of Agriculture to make a farm to farm survey of the entire township. During his investigation Mr. Robertson visited each of the 274 farms producing factory crops. My connection with the Prince Edward branch of the Department of Agriculture at Picton, and the experimental work carried on by that office, kept me continually in close touch with the practical field work of the grower, so that the figures and estimates given are as accurate as was possible for us to obtain. In some instances, however, the growers for various reasons were unable to supply us with figures regarding acreage, yields, varieties, etc., for more than the past year.

Of the canning crops grown for factory purposes, beans, peas, corn and tomatoes are by far the most important, and of these the three last named form the main crop. This investigation will be confined, therefore, chiefly to these three, and particularly to the last two, as the area devoted to the production of the corn and tomato crops greatly exceeds the total acreage in the other two.

History. Both the corn and the tomato are natives of America. The order "Solanaceæ," or Nightshade Family, to which the tomato belongs, contains over twelve hundred species, among which are three of our most wholesome and important vegetables— the Irish potato, the tomato, and the egg-plant. This family also includes the red-pepper, and the narcotics, bitter-sweet, belladonna and the tobacco plant. The tomato was originally thought to be poisonous, but in 1781 we find it being grown for culinary use in Virginia. In the twenty years following, it gradually came into favor, and in 1812 we find it quoted on the New Orleans market. As a canned article of trade, tomatoes were first introduced at Easton, Pa., in 1848, by Harrison W. Crosby, Steward of the Lafayette College. The original cost per can was about five times that of the present.

The canning of corn and tomatoes in Ontario on a commercial basis dates back some thirty years. In 1881 Messrs. Wellington Boulter and Gilbert Barker erected and started into operation canning factories at Picton and Bloomfield, in Prince Edward County. To these two men, then, belongs the honor of pioneering an industry which to-day has assumed a remarkable magnitude. Regarding the recent growth of the tomato industry alone in Ontario, the total number of bushels paid for by the canneries has increased from 132,000 in 1891 to 1,400,000 in 1908; the cases packed, from 83,000 to 880,000; the cans, from 1,992,000 to 21,124,000; the value of the pack, from $190,000 to $1,672,000, and the price paid to the growers, from $26,400 to $386,600. The total output of the factories

of Hallowell Township in all canned vegetables during 1910 was about 500,000 cases, valued at $1,250,000.

The following is a list of the canning factories in Hallowell Township:

Consolidated (Dominion Canners, Limited).

Bloomfield Packing Co., Bloomfield.
Farmer's Canning Co., Bloomfield.
Old Homestead Canning Co., Picton.
Lakeside Canning Co., Wellington.
Boulter & Sons, W., Picton.
Miller & Co., A. C., Picton.
Wellington Packing Co., Wellington.

Independent.

Saylor Co., A. B., Bloomfield.
Orser & Sons, J. B., Chisholm.
Hyatt & Sons, J. W., West Lake.
Morden & Sons, A. A., Wellington.

Soils of the Township. In regard to the soils of the township, a few words will not be amiss. As in most other districts of a rolling nature, we find here also a wide range in the character of the soils, variations being found all the way from heavy or gravelly clays to light sand, with clay or sandy loams as the predominating ones. As for subsoils, clays or gravelly clays are the prevailing types.

Apart from its splendid harbor and beautiful location, Picton, the county town, possesses the advantage of being the centre of the canning industry. To the east of the town, along the south shore of the bay, the land rises sharply until, a half-mile back, an elevation of 150 feet is reached. This northwesterly slope of land, extending along the bay to the eastern limit of the township, is of a gravelly clay nature, with a heavy clay subsoil—rather cold for the production of canning crops unless well underdrained. Along the summit of this elevation the Trenton limestone outcrops, and from this line to the eastern limit, the soil, for the most part clay or clay-gravel and with little slope, is seldom found with sufficient depth to withstand a dry season. This elevation extends also away to the south of the town until, near the township line of Athol and Hallowell, it turns slowly to the east into South Marysburg. The land lying to the east and above this ridge is invariably a heavy clay, with little depth to the rock, similar to that above the ridge just east of Picton. Below this ridge the soil has much greater depth and is more suited to growing crops of any kind.

Directly to the south-west of Picton and extending as far as Athol Township, the country is quite rolling, almost regular ridges varying from one-half to a mile apart, reaching in a north-east and south-westerly direction. These ridges are invariably of a sandy nature while the land between, always heavier, is for the most part clay or 'black' clay-loam with a heavy clay subsoil. That part of the township lying directly south of West Lake is peculiar in its formation. A light sandy soil is found for some distance back from the lake, with a sandy loam farther south and this again gradually blending into a deep clay before the township line is reached.

North and west of Picton the soil is mostly loamy clay with a deep impervious clay subsoil. This extends both north and north-west to the limits of the township. The slightly rolling nature of this region affords fair natural drainage, though in many of the flat reaches, artificial drainage is greatly needed. Between Picton and the town of Bloomfield, and within a four-mile radius of the latter place, is to be found probably the finest agricultural section in the county. Excellent drainage is afforded by the undulating nature of the district, while the soil —a rich clay loam with a gravelly subsoil, can scarcely be excelled in the production of the various canning crops. The land extending beyond this radius to the north of the township is also of excellent quality, though slightly heavier and hence a colder soil.

Along the north shore of West Lake a gravelly sand ridge extends to the town of Wellington. North of this ridge, to the township line, the land is a prevailing gravelly lime stone clay loam, with here and there a heavier gravelly clay. The subsoil is invariably clay or gravelly clay except in a few instances nearer the lake where a marl subsoil was found. Only a portion of this district concerns itself in the production of canning crops, the remainder being engaged in orcharding and mixed farming.

Climate. Being practically an island, Prince Edward County enjoys a climate less rigorous and fickle than that of its neighbors to the north. The winters are tempered by the proximity of Lake Ontario and extremes of summer heat are infrequent. There is also that protection from late spring and early fall frosts, which only the proximity of a large body of water affords. During June, July, August and September, there are from 100 to 120 days reasonably free from frost, in which time a crop may be grown and matured. During this season the day temperature will average from 72 degrees to 90 degrees Fahr., with 15 degrees to 20 degrees lower at night. If to this length of season, a week of May be added, the season is amply long, if proper attention has been given to the crop.

The following figures compiled from the Report of the Bureau of Industries give approximately the average monthly range for the past 28 years, and the monthly temperature for 1909.

—	Highest.	Lowest.	Average per month.	Average for past 28 years, 1882-1909.		
				Highest.	Lowest.	Average.
January	56.8°	—6.2°	24.3°	43.3°	—7.1°	21.0°
February	46.0	—3.1	25.1	44.6	11.2	19.2
March	44.8	6.1	28.6	53.4	—3.0	26.6
April	65.5	11.1	37.9	72.6	15.1	40.1
May	80.1	29.1	49.5	80.0	28.4	51.2
June	87.9	38.0	62.0	85.5	37.5	60.9
July	85.4	42.2	64.8	87.2	43.4	66.5
August	86.9	40.1	67.2	86.1	41.8	64.5
September	90.5	36.1	58.7	84.8	34.2	59.3
October	77.3	24.1	45.5	74.3	24.8	47.7
November	68.3	5.1	40.4	60.9	13.9	36.8
December	47.8	.9	25.5	49.3	—0.1	26.7

Average temperature for June, July, Aug. and Sept., 1909, 63.1 degrees Fahr.
Average Temperature for year 1909, 44.1 degrees.
" " " past 28 years, 43.4 degrees.
Total Precipitation for the year 1909, 36.21 inches.
Average annual Rainfall, 26.87 inches.

Increase in Acreage of Vegetable Crops. The production of canning crop within the township has shown a marked increase in the last few years. Unfortunately we were unable to secure, for various reasons, accurate figures of the acreage and yield for more than the past two seasons. In 1909, the total area devoted to the production of canning crops, other than berries, was 2,461 acres. Last year, this was increased to 3,324 acres, or 34 per cent. more than the previous year.

In the following tables will be found the number of growers, total acreage and average per grower for the years 1909 and 1910.

Acreage in Peas.

Year.	Number of Growers.	Total Acreage.	Average Acreage per Grower.
1909	155	540½	3.48
1910	207	743¾	3.5
Increase	52	203¼	.02

Acreage in Corn.

1909	192	1,390¾	7.3
1910	236	1,855¾	7.86
Increase	44	465	.56

Acreage in Tomatoes.

1909	188	530	2.82
1910	219	699	3.19
Increase	31	169	.37

Total Canning Crops.

Year.	No. of growers.	Total acreage.	Average acreage per grower.
1909	248	2,461	9.97
1910	273	3,324	12.18
Increase	25	86	2.21

Only 25 acres of beans were grown for the factories in 1910.

The Growing of Tomatoes for the Canning Factories.

Varieties. There are a great number of varieties of the different canning crops grown within the township, but only certain varieties have given general satisfaction to both grower and canner. Of the tomatoes there are 15 varieties, of which the Worden, Baltimore, Chalk's Jewel, Bonnie Best and I.X.L. are the favorites.

While scarcely as early as many of the others, the Worden commends itself in being a vigorous grower, a heavy yielder, and specially suitable for canning. The later pickings are much smoother and more uniform than the early ones. This variety is of local origin, though its exact source is not definitely known. It is the most popular variety in the whole county. The Baltimore is also one of the old favorities, late growing but a good cropper. Chalk's Jewel is earlier than the Worden, but is inclined to run off in size. The Bonnie Best is an early variety lately introduced into the township. Like Chalk's Jewel it is a good cropper, fairly smooth, scarcely so luxuriant or late growing and has also a slight tendency to run small in the late pickings. Special seed selection with this variety promises much improvement to one that is already a good canner. The I.X.L. is our earliest variety of canning tomato. A trifle more delicate than other varieties, but it is a heavy yielder on rich soils and ranks first with the canner. It carries a low percentage of seed and thus a high percentage of flesh. The fruit is large and fairly smooth, but the variety tends to run down unless careful seed selection is practised. The Earliana, with its large round fruit, makes a good early shipper, but only a few selected strains are of much value to the canner, the others being too soft and juicy, and not ripening well on the stem end in the late pickings.

The other varieties of tomatoes grown for the factory are: Perfection, Success, Early Baltimore, Stone (very late), Matchless, Favorite, King of Early, Mammoth, Naturalist and Livingstone, none of which can be specially commended to the grower.

Best Soils for Canning-crop Production. Large yields of canning crops can be and have been obtained from soils of varying composition—from the deep "black" clay, muck soils, clay loams, sandy loams and even in the light sandy soils provided the other conditions, such as drainage, tilth and fertility, are favorable. But a maximum crop can never, and a full crop very seldom, be produced on any soil, no matter what its composition, if it is poorly drained, sodden or sour, in a poor state of tilth or too leachy to hold sufficient moisture or available plant food. By the above statement, I do not mean to say that these crops can be produced as cheaply on one soil as on another. This could not be so as the cost of keeping some soils in good physical condition is much greater than with others. A clay soil requires much more cultivation and care than a lighter one, tends to "puddle" more readily in wet weather and to bake when dry. For these reasons, our choice of a soil for the production of tomatoes at the lowest cost per bushel and for maximum yields, should be a rich deep sandy or light clay loam with a well-drained clay subsoil. In saying this I do not wish to discourage the man on the heavy clay or muck soil farm, who, although he will find his cost of production somewhat higher, can raise maximum yields from either of these soils by an adequate system of cultivation and crop rotation. In the case of corn and peas the types of soil best suited for the production of maximum or full crops at the lowest cost are almost identical with those for tomatoes.

Exposure and Location. In sections where there is danger of the plants being affected by early fall frosts before they have ripened their entire crop, exposure of the fields is usually of importance in determining the marketable yield. A gentle inclination to the south with a protection of higher land or timber on the side from which frost or high winds are likely to come is the best. It is frequently found that fields enclosed on all sides either by higher land or timber so as to form a dead air space, are much more readily affected by frosts than more exposed locations where there is a free air circulation. Our investigation gave us 51 per cent. of the vegetable crop of the township on practically level ground; 18 per cent. on undulating land; 17 per cent. with a southern exposure; 8 per cent. with a slope to the north; 4½ per cent. with a western exposure, while only 2 per cent. had an eastern aspect. Turning to our figures of the yields, we find that the first three exposures gave a slightly heavier average yield each than any of those obtained from the soils with other exposures. Much of this increase in yield is no doubt due to earlier maturing of the crops on these exposures.

While exposure is in most cases a factor in determining the total yield per acre, and thus the cost of production, the location as regards distance from factory and the character of the roads between fields and factory are of equal, if not greater, importance in determining the cost of and profit on the crop. The nature of these factory crops is such that they must be marketed within a day or two of the time they are in prime condition, regardless of the condition of roads or weather. These conditions and the fact that one frequently has to wait for an hour or so for his team to unload, make it very important in securing a site, to have it within easy marketing distance of the factory. In Hallowell Township the average distance of the grower from the factory is 1½ miles, and the cost of hauling tomatoes for this distance is estimated at 1½ cts. per bushel and ½ cent per bushel for every extra mile beyond this. Thus the distance from the factory must be carefully considered in estimating the profit or loss in the growing of canning crops.

Drainage. For the production of a maximum yield of corn or tomatoes, the water-table must be sufficiently low to allow of the greatest root development. Tomatoes, corn, and peas will resist drouth much better than supersaturation. A water-soaked soil is invariably a cold one. As before stated the land best adapted to these crops is rather light. Such soils usually give better natural drainage and proper air-circulation through the surface layer. In fields of a rolling nature we find an excellent yield on the slopes, while the plants in the lower places are small, stunted and unthrifty. Moreover, a percentage of the yield from these vines is lost through rotting of the fruit. The cause of these conditions is the lack of drainage and air-circulation in the soil. The excess of water causes "puddling" in wet weather and "baking" of the top layer in dry weather, both of which check root development, which results in the production of a dwarfed plant. The nature of the subsoil also directly influences the condition of the surface layer and where under-drainage is not practised, by its open and impervious nature and distance from the surface, the subsoil will determine the drainage accorded the top soil. Our investigation showed that where the soil was well drained, either naturally or by tile or open ditch, it gave a warm seed bed earlier in spring, secured a higher average yield, a crop freer from diseased fruit and shortened considerably the time from planting to harvesting. Whether secured by selecting a site where natural drainage is afforded, by tile or open ditching, efficient drainage is always essential if maximum yields are to be obtained.

Rotation of Crops. The choice of the tomato ground depends to a considerable extent upon the rotation of crops in vogue. While good yields have been produced after various crops, yet the consensus of opinion throughout the township favors clover sod, and this is well substantiated by the experience of the best growers in other parts of the province. The best crops seen this summer were produced on clover sod. Occasionally we find a grower who, by thorough cultivation and heavy fertilizing, produces tomatoes successfully year after year on the same piece of ground. These are invariably exceptions, where rotation is impossible either for lack of land or other reasons. The practice, from our experience of the past summer, is not to be commended, nor is it advisable to grow tomatoes on ground that was in potatoes the previous year. Both these crops are heavy consumers of potash and considerably reduce the available amount of that element in the soil. The most successful tomato grower in Hallowell township practised a three-year rotation as follows: Cereal, clover hay, tomatoes. He seeded to clover with his grain crop, took one cutting of hay the following year and when the second growth had obtained a height of 6 to 8 inches, he gave it a light coat of manure and then plowed it under. In the spring he prepares this ground by thorough cultivation, thus securing an excellent seed bed in a soil rich in those elements required by the tomato. Such a rotation, together with good cultivation and the selection of good seed, has given this grower an average yield in the past five years of a little over 500 bushels per acre. There is no doubt but that clover sod leaves the land in better condition for tomatoes than any of the other commonly grown farm crops. Failing clover sod, however, the next best is the second crop after clover and of the other preceding crops, peas, beans, corn or wheat are to be preferred in the order named. While a large percentage of the growers raise their tomatoes on ground that was previously in some kind of sod, it is to be regretted that a large percentage practise no particular rotation, the tomato crop having been found succeeding every kind of crop grown in the township.

Source of Seed. A rough estimate places the total amount of tomato seed used annually in Ontario at from twelve to sixteen hundred pounds. Thus the market for seed here is very limited and accounts largely for the fact that much of this is imported. The cost of this seed varies from $1.00 to $10.00 a pound, the average price being about $3.00. J. Bolgiano & Son. of Baltimore; Livingstone Seed Co. of Columbus, Ohio; The Burpee Co.; Wm. Henry Maule Co.; Henry A. Dreer and W. P. Stokes Companies of Philadelphia are some of the firms from whom the bulk of this seed is secured. The majority of the factories have, until recently, retained control of the seed, supplying the farmer at slightly above cost price. In the past few years, however, the grower has been permitted to do his own seed selection or secure it from any source he may see fit. The reason given by the factorymen for retaining control of the seed supplied is that the grower was unable to do as good work in selection as the professional seed grower, and also that the amount of seed used by each is so small that it is cheaper to buy well-selected seed than produce it.

The advisability of the grower selecting his own seed is perhaps questionable. Yet, notwithstanding the attitude factory men take toward this question, I am convinced that more of the seed used in this township should be grown here. Good seed is the foundation of a good crop and every grower would profit by selecting his own seed to suit his own particular locality. Two young plants, grown from the same seed under similar conditions, put out in different soils, may

show a striking difference in crop. Hence I contend that each grower should raise and select his own seed and that a standard of straight seed selection by each is highly desirable and would materially increase the yield and profit. The small amount of seed selection carried on in the township leaves much room for improvment. The indifferent manner in which many growers select for seed a few "good looking" specimens from the crates or from their neighbors' fields, without giving any thought of the type of plant from which they may have been produced, is discouraging. Some of the better growers are, however, taking much care in their seed selection, and in the few years in which they have done so, have obtained considerable improvement in yield, size, smoothness and uniformity. A decided gain has also been made in early maturity, an important factor in escaping early fall frosts.

The following outline for a scheme of improvement by seed selection should prove applicable to the case of the ordinary grower. From the standpoint of soil, climate and market requirements, ascertain by observation and small test plots the type of plant best suitable to your requirements. Keep this type clearly and constantly before you. Otherwise you cannot hope for that success which should come from careful plant and seed selection. Let us presume that you have a field of tomatoes, the seed of which is true to variety. Go through your field and stake out, say half a dozen plants, which in every respect approach nearest to the ideal in your mind. For it must be remembered that the character of the seed thus secured is determined largely by the plant and not by the individual fruit. Thus the selection of an almost perfect tomato from a vine varying in size and perfection is not advisable. In selecting these plants, then, observe carefully the following points:

1. Select from healthy and productive vines. By so doing you will in a few years greatly increase the productiveness of the variety.

2. Select the earliest fruit.

3. Select large fruit.

4. Select the smoothest and best shaped specimens. With reference to shape, the best is considered to be a tomato nearly flat at the stem end, very smooth, moderately full at the blossom and in general nearly oval.

5. Do not pick the fruit until very ripe. The fruit should remain on the vines five or six days after all the green has disappeared.

Having secured satisfactory specimens, thoroughly ripened, the next step is to extract and save the seed. Cut the tomato in two crosswise. Slip out the seed into a pail or small tub and cover an inch or two with water. Let this stand in the sun until the pulp is broken down by fermentation. This will take only a day or two. Then wash thoroughly until all the pulp is carried away and nothing remains but the clean seed. Drain the seed and take as much moisture from them as possible by pressing in a linen towel. They can then be spread on a paper and dried in a sheltered sunny spot or other warm place. It is well to stir occasionally during drying and when thoroughly dried, label the seed from each plant and store in a dry, cool place free from mice, until they are to be used.

The following spring some of the healthiest plants from each package of seed should be set out on well prepared ground, entirely separate from the main crop and keeping plainly marked the block of vines derived from each of the plants originally selected. As these plants mature, select those from that block which most closely resemble the desired type and show the least variation. Such a course of selection should not be difficult to carry out and if judiciously and care-

fully done should, in from three to five years, result in strains greatly superior to the original, and better adapted to one's own soil conditions than any which it might be possible to purchase. The seed from the discarded plants of each year's selection may be used for the main crop, as it will be preferable to that selected from the field crop.

Many of the growers, however, do not take the trouble to handle the tomato seed at all, but secure their plants from greenhouse-men who make a business of starting the plants ready for the field. Others again select their own seed and arrange with the green houses to have their plants started. Still others purchase or select their own seed and grow their own plants.

Prices and Quantities per Acre. Tomato plants purchased from a professional grower will cost on an average about $3 per thousand. The prices paid in Hallowell Township during the past season varied from $2.50 to $7.00, depending upon the size, variety and method of growing. The cost of the seed also varies greatly and while 25 to 30 cts. per ounce is the usual price, even as high as 60 cts. is not exceptional. As good seed is the foundation for a good crop, it is well to select your own or purchase from reliable sources.

The amount of seed or number of plants required per acre will depend upon the planting distance. One and one-half ounces of good seed should produce an abundance of good plants for each acre. The following table gives the number of plants required per acre for the different distances of setting, but in purchasing it is well to have a few extras to provide for losses from various causes.

Number of Plants Required per Acre According to the Distance of Planting.

Distance.	No. of plants required.
4 ft. x 5 ft	2,100
4½ " x 4½ "	2,350
4 " x 4 "	2,600
3 " x 5 "	2,900
4 " x 3½ "	3,000
4 " x 3 "	3,450
3½ " x 3½ "	3,500
3 " x 3 "	4,600

Starting Tomato Plants. In the starting of the young plants lies one of the great causes of ill-success or failure in tomato growing. When the plants are grown by professional growers, they are often held back or suddenly forced to meet the demands of the trade and frequently through rush of business or lack of space, are improperly hardened off. This results in tender plants. Even in many cases where the farmer grows his own plants, through failure to realize the importance of starting a crop with the best of plants, he frequently fails to give them the care they should receive. It is an essential of profitable production that good, hardy plants be procured for setting. A stunted tomato, like a stunted pig, is a poor proposition on which to expend time and labor. Tomatoes will stand a lot of abuse but I am satisfied that abused or stunted plants will never give the results that thrifty ones do. Neither do we desire the tall, spindly kind with light-colored foliage. When ready for the final planting, the plants should be 7 to 9 inches

high, foliage a deep green, a stem the size of a lead pencil and a well developed root system.

The Hotbed. Where only a few plants are required for the farm garden, they may be started in a shallow box or tray filled with rich black soil and placed on a slope in a south window. It is actually cheaper to buy than to raise them in such small numbers. Below, however, will be found a description of the hotbeds, cold frames, and other apparatus necessary for growing the plants on a much larger scale. The equipment described will be found most suitable for the farmer who grows from one to five acres for the factory and while general directions are given for the handling of the young plants, yet these of course must be modified to suit the conditions and requirements of the individual.

In locating hotbeds, choose a warm sunny spot, dry and well drained, with as good a protection as possible from the north and north-west winds. A southerly slope is desirable. The land selected should be about 30 yards long and 10 to 12 feet wide and running east and west.

A hotbed of sufficient size to carry three 3 x 6 foot sash, that is, 9 x 6 ft., will enclose space enough in which to start the plants for a five acre field. In the middle of the strip of land selected, remove the soil to a depth of one foot for a space of two feet larger each way than the size of the frames, that is 11 x 8 ft. Now build up this space squarely with manure to a height of two feet. Fresh horse manure from grain fed horses, without too much litter, will be found the best. Uniformity of composition and in heating must be secured if uniformity in growth is to be expected. This may be accomplished by shaking out and evenly spreading each forkful of manure and repeatedly and evenly tramping it down as the bed is being built up. The frame can now be placed on the bed of manure. It should be 10 inches high in front and 16 inches high at the back. If the back be made of two boards, let one of them be narrow and placed at the bottom so that the crack between them can be covered by banking up with manure or earth. Set the frame on the bed, first placing four short pieces of board under the corners to insure even setting of the manure. Now complete the hotbed by placing on a top layer, six inches deep, of light rich, friable soil. A soil composed of about three parts of garden loam, two parts well rotted stable manure and one part of an equal mixture of sand and leaf mould is desirable.

The Cold Frames. The young plants started in the hotbeds are to be pricked out into these. They may be of the same dimensions as the hotbed frames and for convenience should be placed on either side of the hotbed and extending either way for a distance of 36 feet, giving space enough to hold, pricked out to four inches apart, all the plants which can be started in the central hotbed. The soil underneath the cold frames for a depth of eight inches should be removed and a five inch layer of well rotted stable manure placed in, and this overlaid with four inches of the soil described above. Although thin cloth curtains often replace sash as a covering for these cold frames, yet the sash gives a little better results. The cloth covering is of course much the cheaper.

Directions for Growing the Plants. We now have a hotbed located centrally in the middle of the cold frames, and containing some 54 square feet, upon which we are to start plants enough to set five acres. First, thoroughly level off the soil upon which the seed is to be sown. About the first week in April sow the seed in drills one-half inch deep and 3 inches apart, seven or eight seeds to the

inch. Now scatter over the surface an equal mixture of leaf-mould and sand and press firmly and evenly over the seeds. This covering will not bake or crust, and the tender shoots of the germinating seeds can readily break through. If the soil is dry, sprinkle lightly with tepid water and replace sash, partially shading the same. We now have some 36 rows 70 inches long and sown eight seeds to the inch, or a total sowing of over 20,000 seeds, which should give us enough good plants for our purpose. It will take from three to six days for the plants to break the soil, and the temperature during this period should be from 75 degrees to 85 degrees Fahr. in the day time and from 55 degrees to 65 degrees at night. When the plants have practically all broken through, remove the covering from the sash and reduce the temperature to from 70 degrees to 80 degrees F. The temperature can be regulated by propping open the sash. After about ten days, reduce the temperature to from 65 degrees to 70 degrees F., and give more air. Dull, cloudy weather, too high a temperature, crowding of the plants and insufficient ventilation causes damping off. Great care must be taken not to over supply the young plants with water as this also causes damping off. Endeavor to keep them growing thriftily with as little watering as possible. Some authorities favor two transplantings, others only one. The system here recommended is a combination of the two. As soon as the central bud is well started, prick out the plants to the cold frames, setting them two inches apart. Remove the plants as carefully as possible, preserving the root system intact, and set them a little deeper than they were in the hotbed, pressing the soil tightly around them so that they cannot be easily pulled out. To prevent excessive wilting shade the young plants for the next few days. Don't apply any more water than necessary and be sure that it is tepid. As soon as all the plants are well established in their new positions, admit as much light as possible, being careful that the temperature does not fall below 45 degrees F., and that the plants are not subjected to cold winds. As soon as the plants begin to crowd one another, transplant every other plant, setting them four inches apart; this will leave the whole lot four inches apart, half of them transplanted twice and the other half only once. When set in the field, those transplanted twice, will probably bear the first ripened fruits and those transplanted once will follow shortly. Be careful not to overwater the plants or expose them to unfavorable winds. Maintain a uniform temperature throughout the day of from 60 degrees to 75 degrees F. Observe these precautions and by the time it is safe to set in the open field, you should have good, hardy, stocky plants, which, with subsequent favorable attention and conditions, will produce a heavy crop.

A very convenient article to have when transplanting is a spotting board. This may be about 5 feet 10 inches long, 1 foot wide, with round tapering fingers, about one inch thick at the base and 2½ inches long. These should be fastened into the board, the distance apart the plants are to be set. It should also have narrow projections carrying a single peg nailed to the top of the board at each end, so that when these pegs are placed in the end holes of the last row, the first row of pegs in the spotting board will be the right distance from the last row of holes or plants. By standing on the spotting board while setting plants in the last set of holes, the holes for another set are formed. The cost of the frames and sash recommended need not exceed seventy-five dollars, and might be considerably less if waste lumber were utilized. This could be turned to advantage in many ways when not occupied by the young tomato plants.

Time of Planting. The time of planting or sowing canning crops is determined largely by the locality and season. The time thus varies greatly. Sowing

or planting is scarcely ever advisable until the land is sufficiently dried and warmed to insure early germination or no severe check to the young plants. For the past few years, the "setting out" of the tomato crop has been done during the last two weeks of May and the first week of June. In 1910 almost the entire crop was planted between May 23 and June 3. The condition of the soil is of special importance when it comes to setting out. The worst condition is when the ground is wet or muddy and particularly so on clay fields. Wet soil, cold, dry air and strong wind, are the conditions which we should aim to avoid, while a moist soil, and a still, warm day are to be desired. There is as a rule a certain definite time in every season when the plants can be removed to the field with the least shock or 'set back.'

Distance of Planting. The best distance for setting out tomato plants varies greatly with the soil, the variety, methods of cultivation and other conditions. Plants set as close in rich clay as would give best results in a warm sandy loam, or those of a luxuriant growing sort set as close as for dwarf varieties, would yield little but leaves and every inferior fruit. This probably explains the many differences of opinion as to the proper distance for planting. The following distances were found in practice in the township in 1910. We also give the number of growers using each distance.

Distance.	Number of Growers.
4 ft. x 5 ft.	3
4 " x 4 "	132
3 ft. 10 in. x 3 ft. 10 in.	5
3 " 9 " x 3 " 9 "	38
3 " 8 " x 3 " 8 "	15
3 " 6 " x 3 " 6 "	21
3 ft. x 3 ft.	5

From the above table and from close observation, we must infer that, to secure the best results, most varieties, under average conditions, should be placed in squares at least four feet apart. A few of the best growers contend that even a greater distance than this will tend to produce a heavier yield of superior quality. Free air-circulation and plenty of sunlight are essential for the fullest development of the plants and the production of a maximum yield.

Methods of Planting. The first essential of successful transplanting is to have well-grown healthy plants; the second is that they be in good condition for planting out. This latter can be secured through proper "hardening," and by giving them a few days before setting out a scant supply of water, fullest possible exposure to air and sun and a thorough wetting a few hours before they are to be set. The plants will then be ready for the field.

The day before the plants are to be set out, the field is marked out with a corn marker into squares of the desired size. A still better plan is to set the plants in the fresh cross rows that can be marked out just ahead of the setters.

By means of a flattened shovel or spade, the plants may be divided into blocks, placed on a low flat waggon and removed to the field before the roots have scarcely been disturbed. The plants in the blocks are then cut apart, placed, and the soil pressed about each. If the soil is very dry, water is usually applied—about two

quarts to each plant. The spade system is the one invariably in use in the township, though a trowel or "dibble" occasionally takes the place of the spade. The furrow system is not popular.

In setting the plants, it must be borne in mind that, while sunshine on the leaves of the plant rarely does any injury, it is very injurious to the roots, and their exposure to the sun should be avoided in every possible way. It is wise to handle the plants in the shade of the body and see to it that the blocks of plants are sheltered while waiting to be planted. Such care usually distinguishes the grower whose plants usually do well from the one who has a great deal of re-setting to do.

The Use of Barnyard Manure and Commercial Fertilizers. The experience and opinions of many successful growers vary greatly as to the amount and kind of fertilizer necessary for the production of the most profitable yields on different soils. These differences of opinion are due to the fact that the nature and amount of fertilizing elements to be applied to the soil is dependent upon such a number of local conditions, that no one individual can recommend a certain practice and guarantee success to all who follow it. The more growers one interviews, the greater diversity of practices and differences of opinion are encountered. In general, the application of barnyard manure is not heavy, from eight to fifteen tons being the usual run per acre. The average application for the township on the canning crop ground was thirteen tons per acre for 1910. This is applied to the land either during the winter or early spring and worked in during the spring plowing or cultivation. A few apply the manure to sod in the fall and plow it under immediately. This is an excellent practice. Thorough cultivation of this in the spring secures an excellent rich seed bed, and particularly so if the sod was a clover one. The use of commercial fertilizers, while not at all general, is resorted to by a number of very successful growers. It is invariably used as a supplement to the barnyard manure at the rate of 200 to 500 pounds to an acre. It is usually applied broadcast or worked in about the plants at the time of setting. One grower used as much as 700 lbs. to the acre in the latter way, and claimed for it excellent results. The 2-8-10 Bradely mixture is one commonly used. With some, the liberal application of wood ashes has been found to give better results in increasing the yield than any other special fertilizer.

As previously stated, no set system of fertilizing is applicable to all conditions. The grower will do well to experiment to determine what his soil requires for his particular crops and then supply that need. The requirements of his soil can be ascertained by setting aside five plots, each one rod by four rods. To these he can apply nitrate of soda, muriate of potash, phosphate and ordinary stable manure, alone and in combination. He should also have a check plot to which no fertilizer is applied. The yields of the crops from the different plots will suggest the fertilizer mixture he can use to his best advantage. The grower should also be acquainted with the types of soils to which various forms of fertilizers are most suited. For example, phosphoric acid, from its acidic nature, should be applied to limestone soils in the form of superphosphate, but to sour, swampy soils in the form of basic slag or ground bone.

The grower can also determine from these experiments the actual value of the fertilizers to his soil. This can never be done by theory alone. The action of the various elements in the fertilizers will go far in deciding the amount to use. Thus, an excess of nitrogen will cause the plants to run to vine, throw soft, watery fruit, and to decrease the yield. The use of a large proportion of phosphate tends

to produce soft fruit with a less distinctly acid flavor; of potash, to smaller growth of vine, firm and acidic fruit.

If called upon to make a general recommendation of the quantity and kind of manure for a tomato crop, without any knowledge of the soil or its previous condition, I would say 12-14 tons of good stable manure worked into the soil as late as possible in the fall or in the early spring and 300-400 pounds of commercial fertilizer of such composition as to furnish 2 per cent. nitrogen, 6 per cent. phosphoric acid and 8 per cent. potash. This commercial fertilizer should be sown and harrowed into the soil just before the time of setting. Most growers who use the commercial fertilizer, apply part of all by putting a handful closely about each plant at setting and working it in with a hoe. If it is not desired to use a commercial fertilizer, the amount of stable manure should be increased. We can never afford to get away from a liberal use of the good old stand-by, farmyard manure. Apart from its actual fertilizing value, it has a physical action on every soil—light or heavy—which we usually greatly underestimate. Its application to light soils checks leaching and excessive evaporation. With heavy clay, on the other hand, the soil rendered more friable, less inclined to puddle and bake. The labor of cultivation is thus decreased.

As a parting word on the use of fertilizers on all canning crops, I must say that our experience has proved that in the majority of cases, where the soil is reasonably rich, expenditures in either money or labor for putting the soil in the best possible state of tilth for the crop and keeping it so by thorough cultivation, will give larger returns than those for fertilizers (and particularly commercial fertilizers) in excess of that which the land should receive in the regular rotation for ordinary farm crops.

Cultivation. To no small degree, the success of the tomato crop depends upon good cultivation and proper handling of the soil. A large percentage of the tomato growers of Hallowell township realize this and have the reputation of being intensive cultivators. The object of this intensive summer cultivation is to prevent the soil moisture evaporating into the air. The nearer the condition of the surface soil to road dust, the better will be the results secured. The fine particles of soil act as a mulch on checking surface evaporation.

Most growers aim to give their tomatoes the first cultivation the first or second day after setting, and then once a week each way until the plants block the rows. One can scarcely cultivate too frequently during the first month. The first cultivation should be 3 to 5 inches deep and fairly close to the plants. The depth and width of cultivation must be gradually decreased as the plants develop their root systems. One hoeing, and from seven to ten cultivations are advisable during the season. One very successful grower advocates cultivating until damage is apparently being done to the plants either by the horse or the cultivator.

Harvest Time and Method. Harvesting of the tomato crop lasts from the middle of August to about October 15, depending much upon the particular season. The first pickings, very light, are gathered in baskets and afterwards placed in bushel crates. Later pickings, when ripe tomatoes are numerous, are gathered right into the crates. Roadways are made through the field for the waggons and the crates are placed thereon to be hauled to the factory. The number of crates hauled at a time depends largely on the proximity of the factory and the area under crop. Quite frequently the last pickings are so late that considerable damage is done by the first fall frosts.

Yields. The multiplicity of conditions which influence the yield of canning crops frequently results in crops raised at a loss to one grower and again furnish a handsome profit to another. Many of these conditions are under the direct control of the grower. With some tomato growers the cause of failure can be traced to poor cultivation; with others, to lack of fertility of the soil, poor drainage or careless handling of the plants or fruit. One grower, of whom I know, has an average yield for the past five years of only 165 bushels per acre. Another in the same district, on similiar kind of soil, has an average for the same time of 508 per acre. Individual yields of from 600 to 800 bushels per acre under field conditions are not exceptional. From these figures it must seem that the success of the tomato crop rests almost entirely in the hands of the individual grower. The maximum yield per acre in the township in 1909 was 825 bushels; the minimum 150 bushels. The average of the township for the same season was 285 bushels to the acre.

Prices and Cost of Production. The prices for the various vegetable crops grown for canning purposes have been almost constant for the past few years. Tomatoes have regularly brought 25 cts. per bushel for three years in succession. This price is for the goods delivered at the factory in good condition. A large proportion of the canning crops are grown under contract by which the farmer agrees to deliver the entire yield fit for canning, which may be produced on the given area, at the constant price per bushel or ton. The canner is to judge what fruit is fit for canning, and this annually results in much dissatisfaction. It would seem to the grower that at times the quantity of acceptable fruit paid for was determined quite as much by the abundance or scarcity of the crop as by the weight hauled to the factory.

The cost of the output from a well equipped factory is divided about as follows:

Fruit	30%
Handling, preparing, processing	18%
Cans, labels, etc.	43%
Labelling, selling, and other incidentals	0.1%

Of all the foods used for human consumption, least is probably known of the cost of production of those produced on the ordinary farm. Canning crops are no exception to this fact. Few farmers there are who know at all accurately what it costs them to produce an acre of tomatoes. Fewer still are there, either among producers or writers who can agree as to the cost of production of such a crop. This is accounted for by the varied conditions of the business and individual circumstances. And yet it must seem one of the first essentials of profitable production that we have some definite knowledge of the cost of producing any particular crop on which we depend for a profit. It is only in recent years, and even yet to a slight extent, that the farmer has begun to keep any reliable track of the cost of production of his various farm products. In the following table, secured through some of the best growers, will be found an estimated cost of producing a crop of tomatoes in Hallowell township. A number of these growers have kept very interesting records, which show that they study the different phases of crop production and have a keen grasp of the business. These estimates are made on a five acre basis—land that was previously in clean clover sod. The allowance for labor is as follows: Man, $1.50; man and team, $3.00; man and three-horse team, $3.50; man and horse, $2.00.

(5 acres).

Rent of land, 5 acres at $5.00	$25 00
Manure, 12 loads per acre at 75 cts. a load	45 00
Applying same	20 00
Ploughing, (2 1-5 acres per day), man and team	6 00
Cultivating, 3 times, man and 3-horse team	5 25
Harrowing and rolling	2 00
Marking (4 ft. x 4 ft.)	1 50
Plants, 13,000 laid down in field at $3.50 M.	45 50
Setting plants, $3.50 per acre	17 50
Cultivating, 5 times each way	20 00
Hoeing	1 50
Depreciation of equipment	3 00
Incidentals (resetting, insecticides)	4 00
Total cost of 5 acres	$196 25
Average cost per acre	39 25

PROFIT ACCORDING TO YIELD.

Yield per acre	200 bushels.	300 bushels.	400 bushels.	500 bushels.	600 bushels.
	$ c.	$ c.	$ c.	$ c.	$ c.
Initial cost per acre	39 25	39 25	39 25	39 25	39 25
Picking (3 cents per bushel)	6 00	9 00	12 00	15 00	18 00
Cost of hauling	4 00	6 00	8 00	10 00	12 00
Total cost per acre	49 25	54 25	59 25	64 25	69 25
Amount received at 25 cents per bushel	50 00	75 00	100 00	125 00	150 00
Profit per acre	0 75	20 75	40 75	60 75	80 75

Many growers will contend that the estimates on cost of labor, marketing, etc., are either too low or too high. The estimates given are not expected to fit into all particular conditions that may be found in different sections, but an average of the whole. Value of land, soil conditions, location, labor, and distance from factory, all combine in rendering the cost of producing this crop very variable. Thus it is impossible to quote estimates fitting all conditions in the township. In this case the most of the manure has been charged to the tomato crop alone. This of course should not be, but the low estimate on cost of labor tends to balance conditions.

FUNGUS DISEASES AND INSECTS AFFECTING TOMATOES. The health of the canning crop is entirely dependent upon the conditions under which it is grown. The character and physical condition of the soil, the supply of moisture and plant food, humidity and sunlight, are all factors in influencing the health of the plants and their power to resist infection from fungus diseases. The effect of every dry or very damp seasons is noted in the prevalence during such seasons of the various wilts or insect pests. Nevertheless, the grower, by his methods of cultivation and a judicious use of insecticides and fungicides, can be very effective in controlling the ravages of both these troublesome pests.

Hallowell Township has been fortunate in its freedom from the devastation of various insects and fungi, which are frequently prevalent with these crops. With but few exceptions, the poor, unthrifty fields or low yields met with during the past season were due to causes other than the above. But do not think we are by any means entirely free from their ravages. In several localities the yields

were considerably decreased, and in a few instances the loss of almost the entire crop resulted. Fortunately, it is only in the past few years that damage to any extent has been done, and the growers are now alive to the problems of combatting much further mischief.

Fungus Diseases.

Tomato Blight (*Bacillus solancearum*). This is a bacterial disease which turns the stems and leaves brown and black, and eventually spreads to the fruit. It runs a quite rapid course throughout the plant and spreads quickly from one plant to another, the stem and lower leaves being first affected. It is by far the worst tomato disease in the township and one that has increased rapidly during the past two years. Last summer fields severely attacked by this disease were found in the neighborhood of Wellington, Chisholm and West Lake. In a few cases the disease incurred the loss of a large percentage of crop. Its attacks are worst where the plants are in any way sheltered or the ground moist. The prevalence of this blight in the township has caused much anxiety to the growers.

Remedies. Thorough cultivation, including vigorous, healthy plants, together with frequent changes of the tomato ground, would probably eliminate much trouble from this disease. Spraying with Bordeaux mixture (4-4-40) is effective. The times of spraying are as follows:

1st Spraying.—While the young plants are still in the seed bed, a few days before transplanting.

2nd Spraying.—A week after the plants are set in the field.

3rd and 4th Sprayings.—Spray at intervals of two weeks. If done at all, the work should be thorough, every leaf and stem being covered with a fine spray.

Leaf Spot (*Septoria lycopersica*). This is also commonly called blight. It is a destructive disease, producing small grayish-brown angular spots, which bear the fruiting bodies for the spread of the disease. The lower leaves are first attacked and the disease spreads upwards, at times defoliating the young plants. The fruit is seldom affected. The disease frequently does not appear until the plants are well advanced and loaded with fruit, when it may spread quite rapidly, but too late in the season to do much real damage. The few leaves of which it may then rid the plant aid in ripening the fruit earlier. This disease is quite widespread in the township, but nowhere were its effects very severe.

Treatment. Spray with Bordeaux a week after transplanting, and repeat at intervals of ten days or two weeks. Rake up and burn the diseased tops after the crop has been harvested.

Black Rot (*Macrosporium tomato*). This fungus attacks the stems, leaves and fruit. It is by the destruction of the fruit, however, that it causes the most serious loss. It occurs on the green fruit at various stages of development. The spores of this disease most frequently lodge at the blossom end of the young tomato, and in developing cause a brown sunken spot to appear. These spots increase in size, and sometimes the whole fruit is involved. It is most prevalent in dry weather and on light soils where moisture is lacking.

Treatment. Spray early with Bordeaux, and repeat at intervals of ten days or two weeks. Destroy diseased fruit and burn the refuse from the field in the fall. A short rotation and intense cultivation will also help in its control.

Ripe Rot. This disease occurs in ripe or nearly ripe fruit, causing a rapid softening and decay. Damp, rainy weather favors the spread of it, and it is more

common with varieties that produce a heavy, close vine. It is found chiefly on the crown fruits and those touching the ground. No great loss has been suffered from either this or the previous rot. Spraying as for "black rot" is the treatment. It is always advisable to collect and destroy all infected fruit during the first picking.

Insect Pests.

Cutworms (various species). These are the larvæ or "grub-stage" of dull-colored, night-flying moths, and of all the insect pests they are to be most feared by the grower of canning crops, especially corn and tomatoes, and particularly the latter. Every grower is familiar with their habits of cutting off or partly destroying the tender stalks of the young plants just below the ground surface. This, in the case of tomatoes, means resetting of the plants. The damage is always done at night. A great deal of trouble and loss has been caused in the township by their ravages, and some years as high as fifty per cent. of the plants have had to be reset. During the past two years, however, the growers have awakened to the necessity of combatting their attacks, and have thus reduced the loss to a small percentage. The remedy is a poisoned bait, and of such the "poisoned bran" is the most effective. It is made in the following manner: Place 25 lbs. bran in a soap box or other vessel and gently moisten with half a pail of water, thoroughly diffusing the moisture throughout the bran. Then add the same amount of water, in which 3 lbs. of sugar has been dissolved. Syrup may be used in place of sugar if so desired. The bran, if the right amount of water has been added, should crumble easily between the fingers. Now take ½ lb. of Paris green and dust a part of it over the bran, and mix thoroughly. Repeat until the whole half-pound has been added and mixed.

The bait should be applied in the evening of the same day that the plants are set out, sprinkling just a small amount of the mash around each plant. If the field has been free of vegetation for a few weeks, the worms will greedily devour the poisoned bait during the night. Subsequent applications of the bait should be made at the grower's judgment. Fifty pounds of bran and one pound of Paris green are sufficient for an acre, and can be applied in two hours. Clean farming and good cultivation is helpful, by destroying many of the eggs and preventing the deposition of others.

White Grubs (*Lachnosterna*). These are the larvæ of May beetles or "June bugs," which breed for the most part in old pastures. The larvæ hatch in the ground, where they live for three years. When an old pasture is broken up, they live for a time on the grass and roots, and then attack whatever plant may be grown.

Remedy. Late deep plowing is effective. Pigs and poultry devour them greedily.

Tomato Worm (*Protoparce celens*). This is a large green worm, attaining very nearly four inches when fully grown, and correspondingly thick. They are very voracious feeders, and soon strip the foliage from a plant. They are seldom met with in numbers large enough to do serious damage. They have caused no serious loss to the tomato crop of the township. Hand-picking will keep them in check.

Potato Beetle (*Leptinotarsa decemlineata*). This beetle is so familiar to everyone that a description of it is unnecessary. Only seldom does it feed upon

the tomato, and then just when other suitable foliage is scarce. Arsenate with Bordeaux is the remedy, applied early in June.

Potato Flea-Beetle (*Epitrix cucumeris*). This is a tiny black beetle, about one-twentieth of an inch long. Quite frequently we found growers complaining of the damage of this insect, which eats small holes all over the surface of the leaves and causes much injury to the young plants in this way. Moreover, these wounds provide a suitable entrance to the leaves of the spores of the tomato blight. Bordeaux mixture is a satisfactory remedy for both the insect and the blight.

The Growing of Corn for the Canning Factories.

Varieties, Soils and Cultivation. The following ten varieties of sweet corn are grown in the township for factory use: Early Evergreen, Crosby, Stowell's, Old Colony, Late Evergreen, Hickox, Pearce's Evergreen, Crosby's Improved, Improved Evergreen, and Pearce's Improved Evergreen. Most of these strains, and particularly the first five, have been greatly improved by judicious seed selection and by special breeding practised by a few of the best growers. One is fairly safe in selecting any of these five, all of which give good yields and general satisfaction to both the grower and canner.

The soil best suited for the production of a maximum yield of corn at the lowest cost is identical with that for the tomato crop. Warm loam soils which afford good drainage and sufficient available plant food invariably give the best results. Corn never yields well on heavy, poorly drained soil.

Too much care cannot be given to the preparation of the ground for the corn crop. It requires a slightly higher temperature for germination than our other grains, and thus the necessity for much care in preparing the seed bed. Clover sod, plowed under the previous fall and thoroughtly disked in the spring, can always be depended upon as the starting point for a good crop.

Most growers endeavor to have their corn in the ground by June 1. During the past season over seventy-five per cent. of the corn crop was sown between May 24 and June 2.

The corn is also planted in squares and the distances are almost identical with those for tomatoes, most growers using the same marker for each. Squares of 3 ft. 9 in. and 4 ft. to the sides are the most popular distances, although a great number of the growers plant in squares 3 ft. 6 in. in size.

The canning corn is sown entirely with hand-planters and covered with the foot, the squares having been previously blocked out with the marker.

The canning factories still retain control of the seed corn, most of which is also imported. Lately a considerable amount of this has been grown within the township, but still reaches the growers through the factory management. While most of the seed corn furnished to the contract growers is usually the best, it is always advisable for each farmer to test the vitality of the seed he is about to sow. This can readily be done by spreading a hundred kernels between wet linen cloths placed in the top of a box filled level with wet sawdust. Fasten the lid down tightly on the layer of corn, and place the box where it will keep warm. The corn should be moistened by sprinkling once a day. In a few days all the good grains will have sprouted. From these he can determine the percentage of good seed, and thus be guided in the amount to sow to the hill. The usual cost is $2.50 a bushel. Most of it, however, is purchased by the pound at from five to ten cents.

The average price is seven cents. Seven to eight pounds are required to plant an acre, the exact amount depending upon the distance of planting and the number of grains to each hill.

As previously stated, most growers prepare the ground for corn in a similar manner to that for tomatoes. The average amount of manure applied per acre is about eight tons. This low average results from many growers using no more than for the ordinary farm crop. Those who do make a practice of specially dressing their corn field apply about fifteen tons either in the fall or early spring. As a rule, this is applied to sod and turned under as soon as possible. Only a few growers use commercial fertilizers. The amounts used vary from 150 to 300 pounds to the acre. It is sown broadcast and harrowed in just before the marking is done.

The cultivation of the corn commences as soon as the plants show above the ground and continues once a week until the height of the crop renders horse cultivation harmful. Soils at all inclined to be heavy require more cultivation to keep them in good tilth than lighter ones. All soils should be cultivated after a rain to break up any crust that may have formed, and thus retain for the plants the moisture that has fallen. It is well to be careful, however, not to disturb the soil when too wet. One hoeing during a season is usually sufficient.

Harvesting, Yields, Prices. The harvesting of the corn lasts for four or five weeks from the first of September. The ears are stripped by hand from the standing corn, and thrown into waggons for hauling to the factory.

An average load will weight about one and one-half tons. The price per ton is for the ears before husking.

The cornstalks (stover) are used by the growers for silage, or fed as dried corn during the fall or winter. At one of the factories the husks and waste cobs are cut up and stored as silage. This is sold as fodder during the winter. The price of this silage varies according to the supply of cattle feed in the locality, but is usually from $4.00 to $5.00 a ton.

Corn yielded an average of 3 tons of ears per acre in 1909. The maximum yield was 5 tons; the minimum, 1 ton.

For some years past the price per ton of the ear corn delivered at the factory has been $7.00. It is nearly all grown under contract.

Cost of Production. The following table from a prominent grower gives an estimate of the cost of production of factory corn. The scale of wages is the same as for the tomato estimate, and the calculation is made on a five-acre field that was previously in clover sod.

Cost of Production of Canning Corn.

(5 acres as a basis).

Rent of land (5 acres at $5.00 per acre)	$25 00
Manure (8 loads to the acre at 50 cts.)	20 00
Applying same	9 00
Plowing	6 00
Cultivating (3 times)	5 25
Harrowing and Rolling	2 00
Marking	1 50
Planting	1 50
Seed	3 00
Cultivating (8 times)	18 00

Picking and delivery to factory, 15 tons at 1.50 per ton	22 50
Total cost	$113 75
Cutting down stalks	5 00
Filling silo (60 tons silage)	20 00
Total cost	$138 75
Average cost per acre	$27 75

Or if corn is not silaged:

Stooking	$5 50
Hauling and storing dry stalks in barn	15 00
	$20 50

This amounts to virtually the same as putting it into the silo.

Cost of Growing Silo Corn from Field to Silo.

(5 acres as a basis and a yield of 20 tons per acre).

Rent of Land	$25 00
Manure	20 00
Applying same	9 00
Plowing	6 00
Cultivating	5 25
Harrowing and rolling	2 00
Planting 3 ft. 6 in. by 3 ft. 6 in.	1 50
Seed	2 50
Cultivating (8 times)	18 00
Cutting	5 00
Filling silo:	
(a) 4 teams and 10 men 1 day	21 00
(b) Engine and blower (2 men attending)	12 00
Total cost	$127 25
Cost per acre	25 45

Comparison per Acre.

Sweet Corn:	
3 tons ears at $7	$ 21 00
12 tons silage stalks at $2	24 00
Total value	$45 00
Cost of growing, picking and filling	23 25
Balance per acre	21 75
Silage Corn:	
20 tons Silage at $3	$60 00
Cost of growing and putting into silo	21 25
Balance per acre	$38 75

Comparison as to above valuation:

Sweet Corn:

3 tons ears to factory at $7	$21 00
12 tons stalk to silo at $2	24 00
15 tons of total value	$45 00
Value per ton	3 00
Silage Corn:	
20 tons Silage worth	$60 00
Value per ton	3 00

In reference to these tables it is interesting to note the comparative values of the crop produced for the factory and that grown for silage. The removal of the ears from sweet corn decreases its value as silage by about one dollar per ton.

Fungus Diseases and Insect Pests of the Corn Crop.

Corn Smut (*Ustilago zeæ*). This is an exceedingly common disease, familiar to every grower of corn. On stalks, leaves, tassels and ears appear peculiar growths, usually spoken of as "smut boils." These are white and shiny in the early stage, but later turn dark, with a powdery filling of black spores, which reproduce the disease. The ear is the part most commonly affected. Very little of this disease was found on the corn crop of last season, though in different seasons past it has caused some loss.

Treatment. Remove and burn all the smut growths as soon as they appear; practise rotation of crops. Seed treatment is not effective.

Rust (*Puccinia sorgi*). This disease is seldom serious. The attacked leaves show elongated reddish or blackish pustules on both surfaces. Very little was met with during the past season.

White Grubs (*Lachnosterna*). These larvæ frequently attack the roots and stems of the young plants, and thus prove very destructive. This is particularly so when corn is planted on old pasture land broken up a year or two before. The first or second crops usually suffer most. Clover is least affected by them.

Treatment. Late and deep fall plowing will break up the winter quarters, exposing them to frost and various animals that prey upon them. Pigs and poultry will greedily devour them.

Cutworms. These pests also feed upon the young blades of corn as soon as it is up. The damage is similar to that done on the tomato. The "poisoned bran" is the remedy.

Wireworms. These are the larvæ of click beetles, and have a hard, glassy skin. They breed in old pastures and feed upon the roots of any plants that may be convenient to them. Corn planted on land in pasture the year previous usually suffers severely when they are present.

Remedy. A short rotation of crops and clean cultivation, especially along the fences.

The Growing of Canning Peas.

Eighteen varieties of canning peas were sent to the factories of the township during the season of 1910. Many of these varieties are doubtful value to the farmer, being too low in yield to pay well for their production. The following varieties are the most popular with the growers: French Canner, Hassford's Market Garden, Advancer, Admiral, Alaska and Eclipse.

Peas require a warm, well-drained soil if the best returns are to be secured. Careful preparation of the seed bed is just as essential to the success of this crop as with either tomatoes or corn.

Last season the pea crop of the township was sown between April 1 and May 1. This wide range in the seeding time was due to the variable weather conditions. They are sown either broadcast or with the grain-drill, usually the latter. The amount sown per acre is from three to four bushels, and the usual cost of the seed is $2.50 per bushel.

The canneries still retain control of the seed and provide it to the growers according to the amount under contract.

Few growers apply manure of any kind to the ground on which the pea crop is to be raised. The peas are usually sown on land that was previously in hay or pasture.

Packing Apples in the Orchard.

Harvesting Time and Method. The entire pea crop is harvested during the month of July. Several methods of harvesting are in vogue. The greater percentage of the crop is harvested with the scythe like field peas. The factory men prefer this method. Others first cut them with the mower and use the horse-rake in collecting into bundles. Others again use a special rake for this purpose, which does not require the use of the mower. The vines—not allowed to dry—are hauled direct to the factory, where the green peas are threshed out by machinery.

The grower is paid by the ton for the shelled peas. The price last year was $35 for No. 1 and $30 for No. 2. Practically the entire yield is graded into the latter class. The grower receives back the green straw from his threshing. Various uses are made of this. Some growers pile it to rot for manure. Others feed it green or cure it for winter roughage. Still others unload it where the cattle may pick it over at will. Much of it has to be hauled from the factories as waste. Analysis of this material shows it to have a feeding value higher than any of the straw used on the farm.

The following is an estimate of the cost of production of canning peas. Five acres are taken as a basis, with an average yield of 1½ tons per acre:

Cost of Production of Canning Peas.

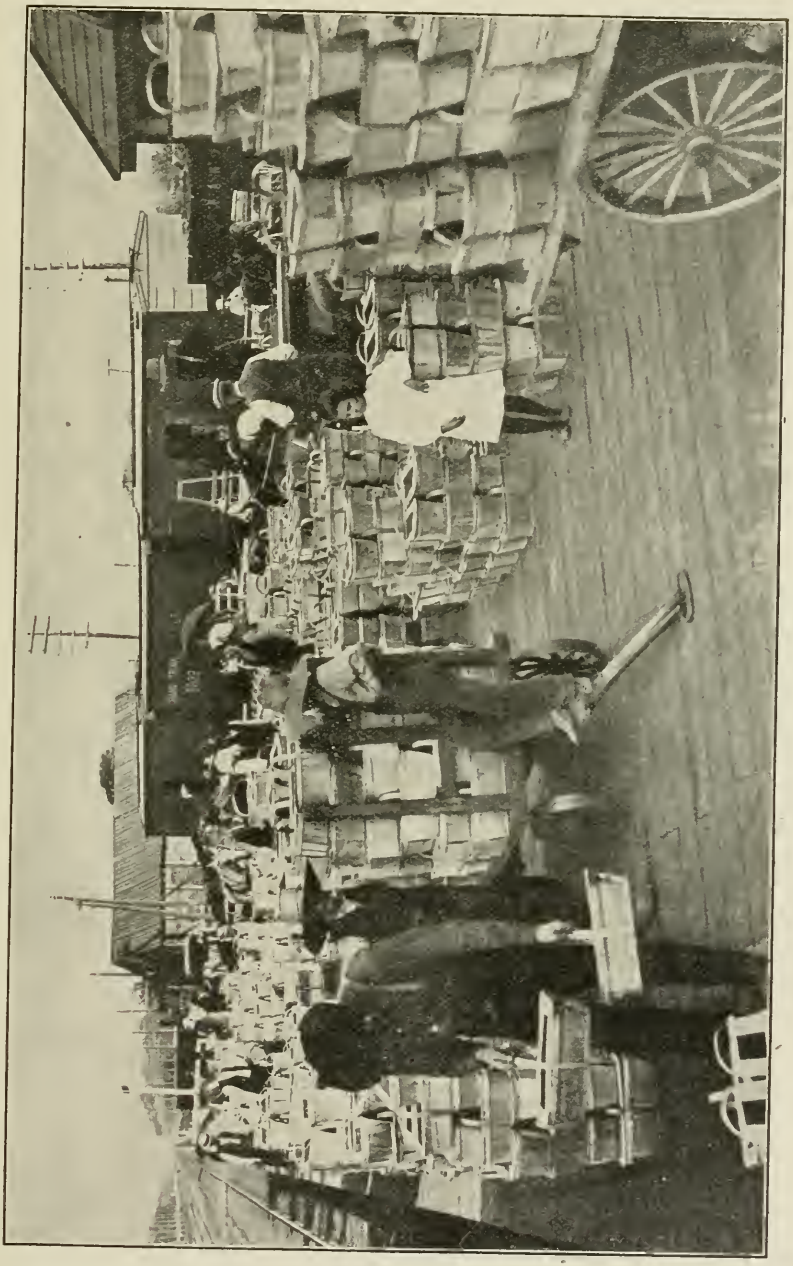
Rent of Land, 5 acres	$25 00
Plowing	6 00
Fertilizers and Cultivation	30 00
Seed, 3 bus. at $2.50	37 00
Sowing and harrowing once after crop is up	5 00
Harvesting (by hand)	15 00
Marketing, $4 per acre	20 00
Total cost of 5 acres	$138 00
Cost per acre	27 60
Returns per acre 1 1-2 tons at $30.00	45 00
Profit per acre	$17 40

Insects and Diseases.

Aphids. Commonly called "plant lice." These are minute, pear-shaped, soft-bodied insects that may be found on almost every kind of plant. They feed by sucking the juices of their host. The young are born in great numbers during the warm season, and thus they increase rapidly, especially in damp, warm weather. These insects did much damage to the pea crop of 1910. In many cases the crop was a partial or total failure from their ravages. Cutting and destroying the patches of peas where the first outbreak is noted is partly effective in keeping them under control. Spraying is impracticable. Fortunately, severe attacks of aphids occur seldom more than once every six or seven years.

Pea Blight (*Ascochyta pisi*). This disease attacks stem, leaves and vine, originating with infected seed. The stems of attacked plants show discolored areas of dead tissue, extending completely around them and destroying the shoot. The leaves show round or oval discolored spots where attacked.

Treatment. Select seed free from the disease. Bordeaux is effective but impracticable for field conditions.



Loading Fruit at the Station.

Green Beans for the Canning Factory.

The growing of beans in the township for canning green is still in its infancy. Of the few varieties grown, the Golden Wax, Yellow Refugee and Green Refugee have thus far produced the largest yield per acre.

Beans require a soil warm and dry for the production of maximum yields at lowest cost. They will, however, thrive on quite heavy soils if the drainage and cultivation are good. The soil should have the same preparation as for the tomato crop. Liberal applications of farmyard manure invariably give profitable returns.

The growers secure the seed either through the factory or from whatever source they see fit. The beans are sown at the rate of one bushel per acre, and good seed for one acre costs $2. Most growers endeavor to have their beans in the ground by June 1. They are planted in rows three feet apart, and sown to have the plants come up about eighteen to twenty inches apart in these rows. The hand-planter is used for the planting, and several kernels dropped at each spot.

The cultivation of the beans commences as soon as they appear above the ground. One cultivation should be given each week until the crop is harvested.

The beans are harvested from the vines by hand as they reach the proper size. The harvest continues during the last half of August and up till the first week in September.

Cost of Production of Beans.

5 acres—Yield 2½ tons per acre.

Rent of Land, $5.00 per acre	$25 00
Manure and applying same	15 00
Plowing	6 00
Cultivation	7 00
Seed	10 00
Planting	1 50
Cultivating and hoeing	8 00
Harvesting and marketing	100 00
Total cost	$182 50
Cost per acre	36 50
Value per acre, 2½ tons at $30.00	75 00
Profit per acre	$38 50

Diseases of Beans.

Anthracnose or Pod Spot (*Colletotrichum lindemuthianum*). This is the commonest and worst disease to which beans are liable. It attacks stems, leaves, pods, and seeds, beginning with the first leaves of the seedling plant. The "spots" of this disease are most conspicuous on the pods, and from these the fungus enters the seed, where it remains unactive until the seed is sown. The disease was found quite prevalent in several parts of the township, and considerable was noticed in the crates at the factories.

Treatment. Since the disease winters in the seed, the most important point is to secure, if possible, clean seed. This can be done fairly accurately by selecting seed from pods showing no trace of the disease. Care should be taken not to work among the plants when they are wet. This spreads the disease.

Rust (*Uromyces appendiculatis*). This appears as small, round, rusty brown spots on the leaves and even on the leaf-stalks and pods. Later these spots become darker in color. The disease is not often serious.

Treatment. Burn the remains of diseased plants. Select resistant varieties. Spray with 5-5-50 Bordeaux when the plants are small. Select clean seed.

Value of Canning Crops as Compared with Farm Crops.

The following table gives a comparison of the value per acre of canning crops with those of the ordinary grains, roots, etc.

Crop.	Fair field in bushels.	Price.	Value.
		$ c.	$ c.
Fall wheat	30	88	26 40
Barley	34	55	18 70
Oats	50	35	17 50
Field Peas	20	85	17 00
Field Beans	20	1 75	35 00
Potatoes	150	65	97 50
Turnips	350	10	35 00
Tomatoes	400	25	100 00
Sweet Corn	3 tons ears	7 00	45 00
"	12 tons silage	2 00	.....
Canning Peas	1½ tons	30 00	45 00
" Beans	2½ tons	30 00	75 00

A comparison of profits cannot be made, as the cost of production of each of the farm crops is not definitely known.

Prospects for Development of the Canning Industry.

Hallowell Township is far from the limit of its productive capacity; in fact, it is only beginning to produce commercially. Both acreage and yield will see a rapid increase in the coming few years. Growers are taking a greater interest in the selection of good seed, varieties, etc., in order that the yield per acre may be increased, and thus the cost of production reduced. Better methods of cultivation and rotation are rapidly gaining a hold on the growers. Not a few are realizing the advantage of underdraining for the growth of these crops. Much attention has recently been paid to the ravages of insect and fungus pests, so that the loss from this course has been greatly decreased.

One of the great weaknesses among the growers is their lack of organization. A co-operative association is needed for educational propaganda. A strong organization would give greater influence with the factory managements, in whose hands the growers are at present quite plastic. Until some such organization work is undertaken, the splendid returns that are possible from this business will not be realized.

The total output of the Province of Ontario during 1909 was approximately 75,000,000 cans, or about 10 cans to each head of the population in the Dominion. This would seem to indicate room for an extension of the business. This extension will depend to a great extent upon the quality of the goods placed upon the market. So far the market has never "glutted" and thereby injured. The formation of the canning factory combine will in all probability prevent such an occurrence, by controlling the supply to meet market requirements. A few independent factories that have been putting up a "special brand" have found this a profitable business, and we may look for a much greater development along this line in the near future.

From their value as a staple food, the demand for canned vegetables and corn must ever keep pace with the rapidly increasing population of the Dominion.

SIXTH ANNUAL REPORT

OF THE

ONTARIO

Vegetable Growers' Association

1910

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

PRINTED BY ORDER OF

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc.,
Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I herewith present for the consideration of your Honour the Annual Report of the Ontario Vegetable Growers' Association for 1910.

Respectfully yours,

J. S. DUFF,
Minister of Agriculture.

Toronto, 1911.

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Ontario Vegetable Growers' Association

OFFICERS.

President: Thos. Delworth, Weston.

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Second Vice-President: T. A. Newton, Woodstock.

Secretary-Treasurer and Editor: J. Lockie Wilson, Toronto.

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C. W. Baker, F. F. Reeves, Thos. Delworth, J. Lockie Wilson, W. W. Weaver.
EXECUTIVE O. V. G. A.

Ontario Vegetable Growers' Association

SIXTH ANNUAL CONVENTION.

The sixth annual convention of the Ontario Vegetable Growers' Association was held at the City Hall, London, on Wednesday, the 14th day of September, 1910. Thomas Delworth, President of the Association, occupied the chair. There was a good attendance of members at the opening session, and the enthusiasm displayed was continued throughout the sessions.

PRESIDENT'S ADDRESS.

THOMAS DELWORTH, WESTON.

I shall review briefly the work of the Association during the past year, and outline suggested plans for the future.

During the past year we took up one or two new lines of work. We issued monthly crop reports during the growing season. This was left to the Executive Committee, and we drew up a blank form for these reports. Before these forms were sent out the reports from the different branches that came in were not on the same line and it was almost impossible to get out a condensed report such as we could reasonably expect the newspapers to publish, and for that reason we got out the blank forms, containing a list of questions, and requested our correspondents to confine the reports as far as possible to answering these questions. Of course, if there were any subjects of interest outside of the specific questions they could make a note of it.

You have all seen these reports in the press. I have no doubt they are capable of improvement, and we are ready to receive suggestions with that end in view.

This year we took up the growing of potatoes, with the object of trying to improve our seed by securing Northern-grown stock. With that object in view we have secured a quantity of potatoes from New Brunswick, some from the State of Wisconsin, and some Old Ontario-grown potatoes, and after an interview with the Hon. Jas. S. Duff, Minister of Agriculture, he consented to grow these for us at the Experimental Farm at Monteith, New Ontario, and to send back the crop to be distributed among our members, so that we could see if this Northern-grown seed would be of any advantage to us. We have on the table samples of the potatoes grown on this farm, and a report will be given you this afternoon dealing more fully with the work.

Vegetable Crop Reports coming into our hands monthly gave us a fair idea of the crop conditions throughout Ontario. I am sorry that I cannot congratulate you on the fact that this has been a bumper year. We had a very dry June throughout the whole of the Province, and this retarded growth very much. I received a letter from our old friend Mr. McMeans, who is now in North Dakota. His records say this is the driest June they have had there in twenty years, so that we have not suffered any more in that regard than other parts of the Continent.

We have been troubled around Toronto with the onion thrip, which has been worse this year than we have ever known it before. Spraying will check it to some extent, but it is very hard to get a spray that will stick to onion tops, and, until we get one that will stick, it will be very hard to fight this pest. I believe it is an insect that can be killed better by contact than by poisoning.

I wish to congratulate the Association on the great increase in membership and the prospects that we have for good growth during the coming winter. We have quite an increase in the branches, but there are some that have not yet reported their membership in full. When these are received we look for a large increase.

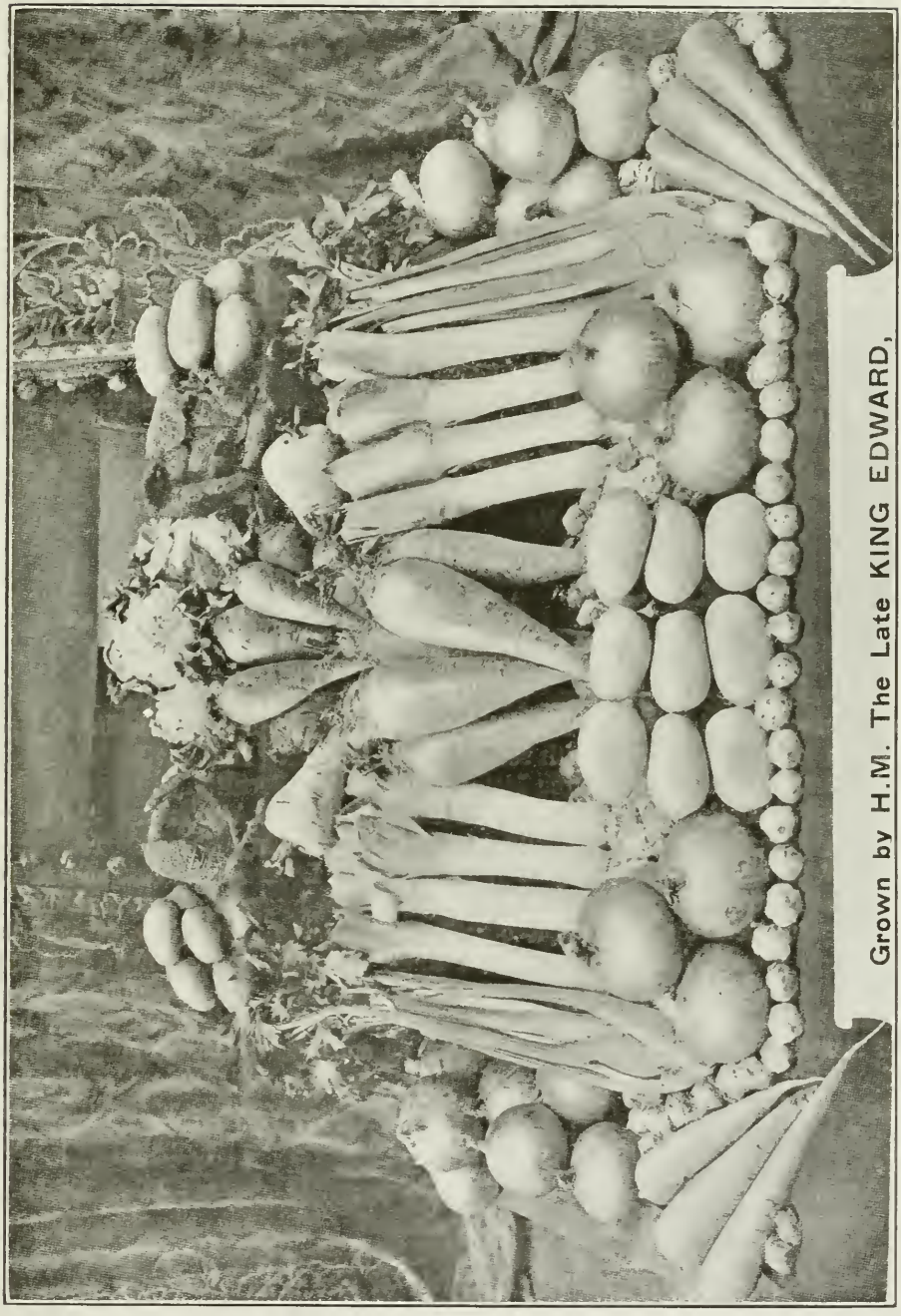
For the past two years we have been trying to get legislation on the seed question. What has been given to us is all right so far as it goes, but it does not go far enough. We have succeeded in getting an amendment to the Seed Control Act which makes it a punishable offence to sell seed which falls below a certain percentage of germination, unless the percentage of seed that will germinate is stated on the outside of the package. That is good as far as it goes, but you all know that the germination of seed is only one of the difficulties that we have to combat. It is a very bad thing to sow a pound of onion seed and not get one to germinate, but it is very much worse to get a pound of onion seed and when this has germinated find that you have a variety that you do not want. If the seed fails to germinate you can make some use of the ground, but if it gives you something that is no use you have to wait a whole season before you discover the error.

Before we can get legislation along this line we must do a large amount of investigating. I am hopeful that some day we may advance to that stage in this country where we can have definite legislation along that line.

A friend of mine was over in England this last winter, and going through the ground of Sutton & Sons, the largest seed farm in the world, he had some conversation with regard to the difficulties gardeners in Ontario have to contend with, and it was stated to him that they had a law in England that punishes seedsmen and makes them liable if they sell seeds that are not of the variety and type represented. England of course is a very old country, and while, as a loyal Canadian, I cannot admit that any country is ahead of us, still it is possible that we have something to learn from them yet.

Another question that is a burning one with the Vegetable and Fruit Growers is irrigation. I spoke a few moments ago of the dry weather in the month of June. I do not think there is anyone in this hall to-day engaged in gardening or fruit growing who would not have a large amount of cash in the bank or in his pocket if we had had some means of overcoming the dry weather in the month of June. Two years ago we had with us Professor Macoun, who has been with us at most of our conventions. He gave an address dealing with this question. Very great strides have been made in this matter in the last few years. Professor Macoun's address was a most excellent one, and dealt with the question very thoroughly up to that date. We hope to have with us this afternoon Mr. Coles, from Troy, Ohio, who represents the firm who have made very great success in installing irrigation plants. These are used very largely in the neighbourhood of Cleveland, and they are proving quite a success. It is also a live question with us. I intend experimenting with it myself this coming season, and I know you will be all pleased to hear Mr. Coles.

The matter of seed investigation and seed potatoes and irrigation are questions that should be thoroughly looked into.


Grown by H.M. The Late KING EDWARD,

Another matter that we want to have settled is the adopting of a standard weight for bushels of various kinds of vegetables. We have a Dominion Statute fixing the weight of most of the leading varieties of vegetables as they are offered for sale. That Statute fixes the weight of parsnips at 60 pounds per bushel, and those of you who have ever placed parsnips on the market know very well that a bushel of parsnips does not weigh 60 pounds. A member of the Toronto branch took an order for 50 bushels of parsnips, thinking of course that he could deliver them by the bushel. He sent his son in with the parsnips, and the purchaser weighed them instead of taking them by the measured bushel, and sent back a slip of paper giving the weight and a copy of the Dominion Statute, showing that he would still have to send 14 bushels of parsnips in order to make up the 50 bushels. The gardener had no redress, because the Statute fixes the weight at 60 pounds. We think there should be some standard fixed as nearly as possible to the actual weight of a measured bushel. This member of our Association lost 12 or 15 pounds on each bushel of parsnips.

I thank you very much for your kind hearing and for being present here to-day. We have a good programme, and I trust we will have a pleasant and profitable time. This is the first occasion that this Association has met in convention outside of Toronto, and we are pleased to be with you in London to-day.

ADDRESS.

C. W. Baker, London.

I wrote asking the President what he was going to speak on, and he replied that he never wrote an address in his life, and I do not believe he ever did, because he seems to be always ready with something of interest. However he told me he would speak on the subject of the Maintaining of Soil Fertility, and I think that is something similar to maintaining an interest in our Association, and if we are going to maintain the soil fertility we must keep adding something to it every year, and so in the maintaining of interest in our Local Association and in the Provincial Association we must keep adding new life by getting new members.

Our President touched on the question of irrigation. It is one of vital importance to the vegetable growers, and I think we might apply a little irrigation to our Association by having good speakers. Men who are up-to-date in their several lines address us, and we should see that our Branch Associations have good men sent to them. Our crops will not do much good without water; neither will our Branch Associations do well unless they are well watered with good addresses. The best men to send out to the Branch Associations are those who are actually in the business, and who have to earn their living at growing vegetables.

While Mr. Delworth was addressing us I was wondering if we appreciated all the work our officers do for us. .I know of cases where they have gone long distances in order to address meetings and we should appreciate what they are doing. It is work that will count in the future and be of benefit to the coming generation after we are gone.

This Association is just six years old, and I can see in the future grand things for it.

The question of standard weight is an old one, and I think pressure should be brought to bear on the Dominion Parliament in order to have a proper stand-

ard fixed. If it is right for us to have it, let us get it and not sleep our time away and keep losing money all the time. We buy together and make money, why should we not sell together and make money, and by getting a standard weight we will be helping each other.

There are pests that attack our small fruits and destroy our crops, and in some of our Branches we have men who clog the wheels, and it is up to the members to see that they do not drag and keep the Association back. There are some men who will hang on to an office because they think that no one else can fill the bill as well as themselves. A Branch Association which is unfortunate enough to have these men should get them to stand aside and give younger and more energetic men a chance. Get young blood and new life into the Association and keep in the background those who will not help.

We have with us to-day one of our greenhouse men who does as much for the London Branch Association as anyone, and yet he never says a word at a meeting. You cannot hire him to speak, but he can talk privately to a man, and I know man after man that he has brought in. This is the still small voice; and that puts me in mind of a small man with a small voice who woke up one night and saw a big manufacturing plant near his home on fire, and the first thing that occurred to him was to wake up the community; but he knew that his neighbour was a good, strong man with a big voice, and as he was going out the door he said to himself, I will get John Jones; he is a big fellow with a powerful voice, and he will wake up the whole town. So he got John Jones with his big voice, and the town was roused and the conflagration checked. So it is that these men who cannot speak themselves can sometimes rouse up others, who, in turn, become towers of strength to our Association.

W. J. Kerr.—I would like to tell you how Mr. Hogg, near Ottawa, waters his celery during dry weather. His garden is on a slope of a hill, running down to the bottom, where he has a well with an inexhaustible supply of water. A wind mill pumps the water to the top of the hill, and during the dry weather he attaches a hose to the hydrant at the top and runs the hose into the centre of a piece of tin pipe. This pipe has an outlet at each end and in the centre, so that he can water three rows at a time. He puts it down on the ground and goes on with his work and when he thinks the water has reached the bottom he comes back and moves it over three rows further, and continues that process until the whole is watered. The water percolates down along the trenches to the bottom, but will not go in, because there is loose soil there that absorbs it, and you can see by the celery just where the water has been and down in the low soil, where the best celery would be if it were not for the irrigation, the celery is not nearly as good as higher up the hillside. The hill faces the west and the celery would have been cooked during the hot weather of this season if it were not for the irrigation. Yet this is one hundred per cent. better than the celery at the bottom of the hill.

It is a fact that we do not appreciate the work of our men as we ought. Any man who has made two blades of grass grow where one grew before is a public benefactor, and the work these men are doing is of vast importance to us, and any man who will leave his work as many have done and go out to help educate the members of this Association deserves the highest thanks we can give them.

It is necessary to keep up the fertility of the soil, and in order to do that we must use a great deal of fertilizer. The crops we are now growing are composed very largely of water, but still we require other ingredients in the soil than this. By means of irrigation and by keeping up the fertility of our soil we can be more successful in our business.

REPORT OF THE SECRETARY-TREASURER.

J. Lockie Wilson.

A new departure has been taken by your Directors this year both in changing the date of your Annual Convention and also holding it in the Forest City instead of at Toronto. This was accomplished through the efforts of the energetic members of the Board hailing from Western Ontario. When the decision to change the place of meeting was arrived at, it was understood that the excursion rates for such an important Exhibition as the Western Fair would have extended over the Province of Ontario. When I discovered that these rates were limited to points west of Toronto, I promptly communicated with Mr. Hunt, the Secretary, and he informed me that the rates covered the Province. I forwarded his letter to the Eastern Ontario Passenger Agents' Association at Montreal, and was advised that our delegates east of Toronto who attended our Convention would be required to pay full fare. This is one rather serious disability that we have to contend against in holding our Convention here. However, I am pleased to note that it is largely attended from every section of the Province, and the result of our meeting here should prove of lasting good to all engaged in vegetable growing.

Crops are fair and prices received therefor satisfactory. Your Directors are taking up the matter of lower express rates and trust ere long that more reasonable charges will prevail.

The revision of weights and measures for vegetables will be brought before the Dominion Government at the incoming session and we trust that they will receive the attention of our law-givers and a proper standard formulated in accordance with the suggestions made. The following is the suggested standard: Parsnips, 45 pounds; carrots, 50 pounds; beets, 50 pounds; artichokes, 56 pounds; onions, 50 pounds; potatoes, 60 pounds; turnips, 50 pounds per bushel. The present standard is 60 pounds, and many commission houses buy by weight and not by measure, with a consequent loss to the grower. Potato bags are supposed to hold 90 pounds, whereas in many cases sugar sacks are used, which hold only 75 pounds, and customers, not realizing the difference in weight, feel it a hardship to pay more for one bag than for another. A standard bag of 80 pounds has been suggested, which would hold about 1¼ bushels. The proposed standard weights for other vegetables by the bag are: Artichokes, 75 pounds; beets, 70 pounds; carrots, 70 pounds; onions, 75 pounds; parsnips, 60 pounds; turnips, 70 pounds. Potatoes by the barrel, 160 pounds.

The monthly crop reports sent out by our Association are much appreciated by all interested in vegetable growing.

The work of this organization is extending every year. An onion experiment was started last year, and it proves something that will be of value to the vegetable growers of this country. I was at the Government Experimental Station at Monteith looking over the ground there, and, knowing that large quantities of seed potatoes were brought here from the different States of the Union and from the Provinces down by the sea, the thought occurred to me that, having this great

expanse of territory in New Ontario, over 16,000,000 acres, we could do something to assist in developing that territory, knowing that in many parts of New Ontario potatoes are grown with success, although sometimes the tops get frozen; still, the potatoes come to full maturity. I brought the matter before the Executive Board, and we invited the Honourable Mr. Duff and Mr. Beaume to come to our Directors' meeting. This they did, and we made a proposition to them that the Ontario Vegetable Growers' Association, knowing the best variety of potatoes required in the whole of Ontario, would supply a quantity of these potatoes if the Ontario Government would have them planted at the Monteith Demonstration Farm. The suggestion was taken up, and the Minister of Agriculture agreed that if we would supply the quantity of potatoes, 20 bushels, to be grown on the Demonstration Farm at Monteith, he would ship the crop from that 20 bushels to us, to be distributed to the different branches of the Vegetable Growers' Association all over this Province, to be grown and experimented on by the Vegetable Growers, and if we were satisfied with these potatoes, and they were up to the proper standard, then the settlers in New Ontario would have an excellent market for this product, because potatoes are easily grown in that virgin soil, and they are not troubled by the Colorado beetle or blight in that section. This would certainly mean a good deal for the Province. Mr. Dandridge was good enough to present us with two bushels of splendid potatoes, and we had two barrels sent us from New Brunswick. You can see by the sample exhibited here that they certainly look all right. If we can produce a sufficient quantity of potatoes in New Ontario we shall be saved the extra expense of importing large quantities from the United States and the Lower Provinces.

I was in Great Britain and the Continent this summer in connection with business pertaining to the Department of Agriculture, and I am sure if I could only have absorbed all that I saw in these different countries it would have been of great interest to the vegetable growers here to-day. We have looked upon England as chiefly a manufacturing centre, but I was surprised in going over that great country to find, notwithstanding their iron and cotton industries and their great ship-building plants, that agriculture was still in the forefront, and that it is the greatest single industry of that country. Five crops alone grown by the English farmers last year amounted to three hundred and seventy-four millions of dollars. I saw one farm in Kent with one thousand acres of potatoes, another with one hundred acres of strawberries, and other crops in similar proportions. The production is something wonderful. Intensive gardening has reached a very high mark in that country. Here vegetable growers are going along pretty much in the old lines on which their fathers worked; but now we are building up larger cities in this country; larger populations are being formed all over the Province, and it is up to the vegetable growers to meet the demands of these great cities that are growing so rapidly in wealth and whose citizens are willing to pay high prices for what we produce. When a man becomes rich he wants to get stuff that other people cannot afford to buy, and it is up to you gentlemen to produce this class of vegetable products: but you cannot do it with our climate and our winters and late springs, unless you grow it as they do in England, France and Belgium, that is, under glass. It will be expensive starting, but I am sure it will pay you to produce early varieties, because large returns will be the result. Vegetables are grown largely by this method, and this industry covers eleven hundred square acres, which represents a strip fifteen feet wide and six hundred miles long covered with glass. That will give you an idea of what English growers of fruit and vegetables are doing. I believe there is a great future for our

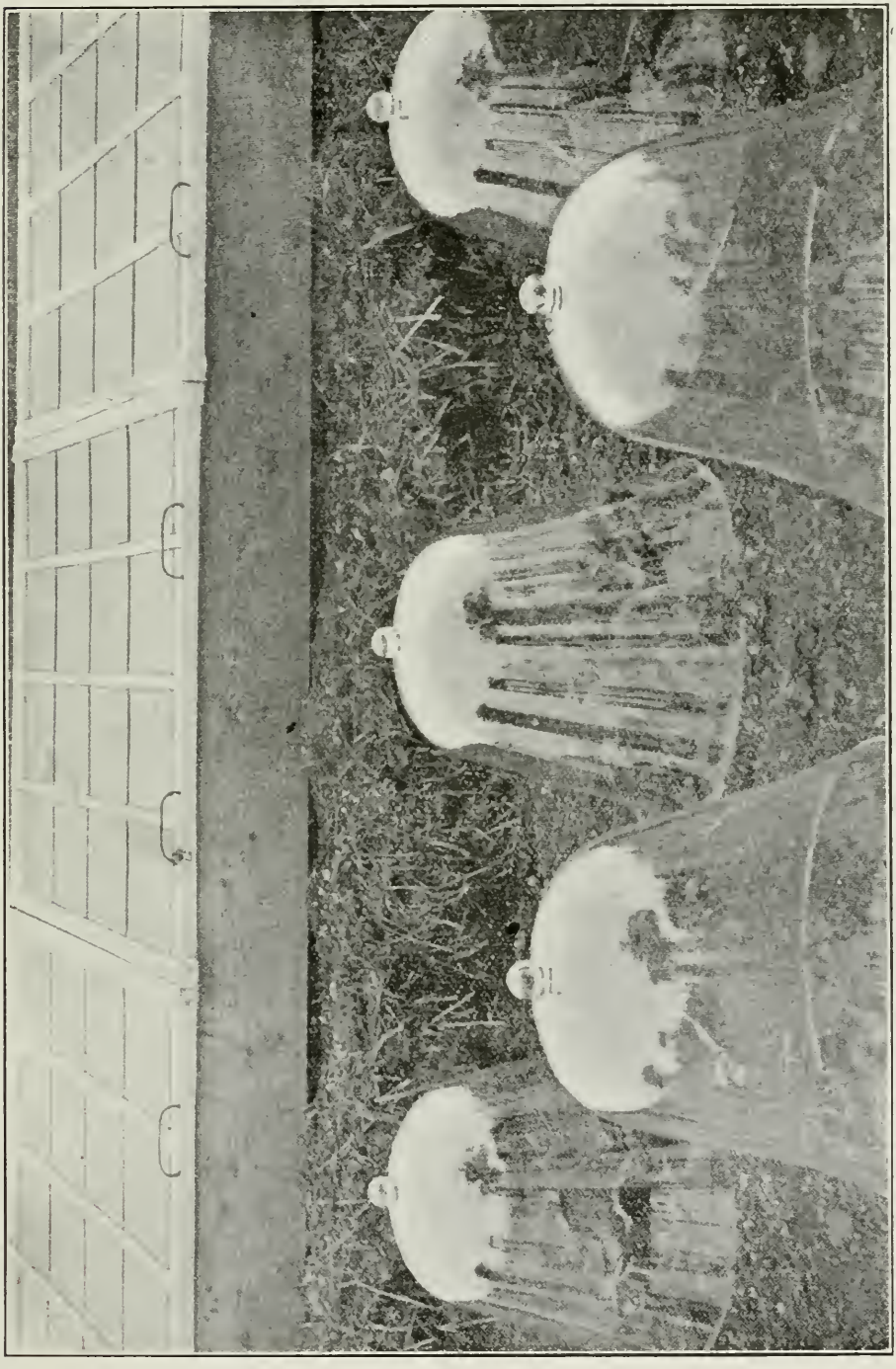
growers in this country who are enterprising enough to take up the growing of fruits and vegetables under glass. Strawberries grown in midwinter have realized from twenty-five to fifty cents per box.

In one establishment I saw tomatoes that were singled out to one plant and were trained up along the sides of the hot-house for eight or nine feet. Three crops are grown in a year and the yield is from 20 to 35 tons. In one house 40 ft. by 12 ft., 2 rows of tomato plants were grown in each border, or 4 rows in each house, the plants being 1 ft. apart in the rows. They were trained on wire in single stems to the apex of the roof, about 8 feet. The number of plants in each house was 116, and they yielded 850 pounds of fruit, or 7 pounds 5¼ ounces per plant, about 34½ tons per acre. In this case apparent loss of space was fully made good by utilizing the height.

In most cases the first crop of tomatoes is picked about the beginning of May and the last about the end of September, but some growers have suceeded in having them on the market by the middle of January and as late as Christmas. Varieties grown are: Queen of the Earlies and Old Red for early market; Comet for the main crop, and Stirling Castle as the late variety. The Trophy and Chemin are other varieties grown.

In one of the Canary Islands they are growing tomatoes for the English market, and I saw in Covent Garden fruit and vegetables from many of the countries of the world—Belgium, Switzerland, Denmark, New Zealand and the Islands of the Sea. This one little island of the Canary group has been shipping tomatoes to England for twenty years, nearly a million dollars' worth a year. They are packed in peat and sawdust, and the distance they ship them is about the same as the ocean voyage from Canada, and they reach the English market in good condition, and the average price paid is from two to six pence per pound.

Ontario is particularly adapted for the growing of tomatoes. We grow thousands of tons and the prices paid are not too high. The average price during the last two years has been from 23 to 25 cents per bushel. I am speaking of tomatoes grown for canning purposes. There are about 60 pounds in a bushel. There is no reason why Ontario should not try the experiment of shipping this product to London, Glasgow or Liverpool. Our tomatoes are of a better flavour than those grown under glass in England, or those sent from the Canary Islands. A few years ago a shipment of tomatoes was tried by the cold storage branch of the Federal Government, but cold storage was in its infancy then and they did not understand the proper methods, because cold storage after all is not the best way to ship them. It is found that when the tomatoes arrive in England and are taken out of cold storage and opened on the markets, when the heat strikes them they begin to sweat and crack, and their market value is destroyed. Mr. Alfred Jury, Dominion Government Agent in Liverpool, in discussing the case with me, said, "The system formerly adopted was not the right one. I had two baskets of tomatoes given me some two or three years ago by a friend and took them to my stateroom on board the ship and placed them under my berth. After I arrived in Liverpool, I discovered that there was a steam pipe running behind where the baskets had been placed and at once made up my mind that they would be spoiled, but to my surprise when I opened them up I found they were all in perfect condition. I then remembered what the farmer's wife does in the fall when the tomatoes are not ripening very fast. She picks them a little on the green side, but does not put them in the cellar or in cold storage, but hangs them up where the sunlight will strike them, or she puts them on top of the cook house and leaves them in the sun two or three weeks." We are going to test this matter, and the



Bell Glasses for Protection of Vegetables.

Ontario Government is going to make some shipments to the Old Country within the next few days. The experiment is worth trying, and I believe we can get our tomatoes into the English market in good condition, and that in the future we will be able to ship hundreds of tons of tomatoes over there.

A number of branches have not made the progress they should have during the first eight months of the year. It is hoped that the remaining four months will be utilized in adding largely to our membership.

English Hot House Tomatoes, Evans No. 1. The vines grew fifteen feet high and averaged 21 lbs. to the vine.

ONTARIO VEGETABLE GROWERS' ASSOCIATION.

Receipts, 1910.

Balance on hand from 1909	$319 17
Membership Fees to Central Organization	72 20
Interest	25
Refund on Vegetable Growers' Entries at Horticultural Exhibition, 1909	38 00
Grant, 1909	800 00
Total	$1,229 62

Expenditure, 1910.

D. H. McLennan, Toronto, Auditing Books, 1909	$5 00
Printing Programmes, Letter Heads, etc.	23 50
Membership Competition, 1909	30 00

Services at Horticultural Exhibition, Arranging Vegetable Exhibits, etc., 1909	15 00
Grant to Horticultural Exhibition, 1909	50 00
Membership Fee, Horticultural Exhibition, 1909	5 00
A. McMeans, Stenographic Services in Preparing Paper for Report	3 50
Onion Experiment, 1909	7 50
Potato Experiment, 1910	57 34
Convention Expenses, 1909, C. W. Waid and C. W. Nash	35 50
Convention Expenses, 1910, including expenses of delegates, etc.	139 58
Reporting Convention in 1909	25 00
Reporting Convention in 1910	25 00
Petty Cash	5 00
Executive Expenses, Salary and per diem, 11 Meetings	108 55
Directors' Meetings, Nov. 10th, Feb. 8th	137 75
Delegate to Grand Rapids, 1910	25 25
Crop Reports, 1910	74 00
Organization Expenses *re* Meetings held at Belleville, Napanee, Picton, Oshawa, Whitby, Brantford, Stratford, Berlin, St. Thomas, Sarnia in 1910	208 60
Total	$981 07
Balance on hand	248 55
Total	$1,229 62

Audited and found correct.

(Signed) D. H. McLennan.

I thank you for the courtesy extended to me during the year and I hope that we will put renewed vigour into our work and that we will increase our membership and build up a strong Association that will be of great benefit to all concerned.

The President.—We are all very much interested in the experiment of shipping tomatoes to England. I am glad to know that the flavour of our tomatoes is very suitable for the English market. This is a point on which there was some doubt expressed by certain persons, but it seems to have been cleared up very satisfactorily, and the leading experts say that the flavour of our tomatoes is very suitable for the English market.

EARLY POTATO GROWING.

F. F. Reeves, Humber Bay.

I have experimented with early potato growing, and have had the privilege of addressing two or three Associations, and will give you the result of what I have proved for my own satisfaction.

In growing a crop of early potatoes I prefer a sandy loam facing south or south-east, sheltered as much as possible from north winds. As the majority of gardeners use green manure it is best to plough in a good coat the previous fall. The manure will then be well rotted and incorporated in the soil by spring. I find that when it is ploughed in in the spring the results are frequently unfavourable. It has a tendency to cause the potatoes to scab, and also, if we have a dry, hot, summer, it causes the land to be too loose and to dry out far sooner than it would do were it more solid.

The variety most generally grown in the vicinity of Toronto by vegetable growers is the Ohio Junior. It combines two features that are sure to commend themselves to the grower; one is its extreme earliness and another that, when you

start to dig, the tubers are practically all marketable. Some growers are using the Eureka, which matures a few days later, although, when it comes in, it is a heavier cropper than the former.

Many growers start a part of their early potatoes in a spent frame or greenhouse. We usually do this the first or second week in March. In forcing for earliness it is well to remember that a whole potato will crop earlier and heavier than a cut one. I prefer them the size of a hen's egg. The potatoes should be cut to the size wanted before placing for sprouting. We usually lay boards on the bench or frame where we want to sprout them. Sprinkle about an inch of soil on the boards, place the potatoes, cut side down, as close as they will lie; then cover them nicely over with soil. The reason for using the boards is to prevent the roots taking too great a hold on the soil; if allowed to do this they receive a check when taken up. Care must be taken in planting to see that the roots and sprouts are not broken.

A MEMBER.—Could they be sprouted on boards in the cellar in the way you suggest?

F. F. REEVES.—Just the same. I generally sprout mine under the greenhouse benches. The advantage of the board is that the potatoes make a strong and vigorous growth, and, when you transplant them, they do not wilt down.

A MEMBER.—With what depth of soil do you cover them?

F. F. REEVES.—I prefer 3 or 4 inches. If we have a late spring like last year, you cannot put them out so early.

A MEMBER.—When you put them out, do you leave part of them above the ground?

F. F. REEVES.—Yes, as a rule. One year I tried the experiment with strawy manure. It was satisfactory, but the expense was too big. We had the manure laid in convenient piles, so that in case of frost we could cover them, and then we had to uncover them, and the expense was so heavy that it did not pay.

A MEMBER.—Did you allow them to work their way through after that?

F. F. REEVES.—The first rain will uncover them.

As soon as the ground is fit to get on in the spring it should be well disked and harrowed. Shallow furrows, 30 inches to 3 feet apart, should then be run out. If the furrows are left open for a few days it will be a great advantage, as it will enable the sun to warm up the soil.

The date of planting will vary in different sections of Ontario, but should be done as early as one can get on the land without packing it. In planting, it pays to place the set right side up. If this is not done the sets that happen to fall with the sprouts up have the advantage of fully a week over the others and, to a large extent, this is the cause of the crop coming up irregularly. When the sets are in, go along the rows with a hoe or rake, and pull sufficient soil over to cover nicely.

Another little thing that cannot always be done on account of time is hoeing out the holes for early potatoes. I do not know what your experience has been, but mine is that if you hoe out a hole you will get the potatoes earlier than if you planted them in furrows. I cannot explain it, and I do not know why it is, but it is an actual fact with me.

In about two weeks the weeds will be showing; it will be wise then to start the scuffler going. The scuffling should be done every week till the tops are large enough for moulding; after that it will only be necessary to pull out the large weeds. Great care should be taken in scuffling not to go deep close to the rows. If the potato roots are disturbed, it means a great loss in the crop.

A MEMBER.—Do you have any trouble with the potatoes becoming exposed?

F. F. REEVES.—We mould up after that when they get big enough. The main thing in growing early potatoes is to get the sun right into them. We generally plant the rows three feet apart, and we get the second crop in before the first is taken off.

A MEMBER.—How close do you plant them?

F. F. REEVES.—Nine inches apart in the rows.

A MEMBER.—What do you count a good crop?

F. F. REEVES.—This year I had what I consider a very good crop. They were planted on celery ground, black muck. The rows were about 350 feet long, and they were planted in hills three feet apart each way. We dug the first on the tenth of July, and got six bushels to the row. I dug again four days after and we got seven bushels to the row, and they gave an average of about seven bushels for a 350-foot row, which I consider a very good crop for early potatoes. The crop sown from seed did better, but they were late.

Potato Planter at Work.

A MEMBER.—Do you think you could get as large a crop from sprouted seed?

F. F. REEVES.—You get an earlier but not as heavy a crop.

A MEMBER.—Would you advocate planting three feet apart each way?

F. F. REEVES.—With the rows three feet apart the tops covered the ground, and I could hardly get between the rows to plant cauliflowers, which was done before we dug the potatoes.

J. W. RUSH.—Your land does not suffer very much from drought?

F. F. REEVES.—No, I have a garden that will stand dry weather better than any other around me.

A MEMBER.—Do you get sufficient price for these potatoes to pay for the trouble?

F. F. REEVES.—Yes, if you take into consideration the fact that you are sure of a second crop. Take an ordinary crop of potatoes, and you must have a very good season in order to get a good crop of cabbage or cauliflower afterwards.

A MEMBER.—How much per bushel would they average?

F. F. Reeves.—This year we got $1.50 per bushel, and they dropped from that to $1.00, and in one day from $1.00 to 60c., and the early ones were the only ones that paid.

A Member.—What is the average crop of potatoes in Ontario?

F. F. Reeves.—Ninety to ninety-five bushels per acre. Last year Mr. Dandridge dug a bushel of potatoes to the rod.

A Member.—What cover crop do you use?

F. F. Reeves.—Nothing, we have no time for that. We just use stable manure in the gardens around Toronto, which run from five to ten acres, most of them being only five acres.

A Member.—At what rate per acre do you apply the manure?

F. F. Reeves.—I work six acres and a half to seven acres, and I put on 250 team loads of manure. I haul five loads every week, besides what is made at home from three horses and a cow.

A Member.—Are you bothered with the white grub?

F. F. Reeves.—A few of them, but we were troubled more this year with the cut worm in our potatoes than with anything else.

A Member.—What do you do for the cut worm?

F. F. Reeves.—Apply paris green with molasses and bran.

In growing potatoes, as all other garden crops, insect pests and blight have to be taken largely into consideration; one has to get after them early, and stay right with them. As far as the ordinary potato bug is concerned, the liberal use of paris green will keep it in check. Many growers use it pure, put on dry with a paris green gun. Others use a solution of one ounce of paris green to two gallons of water, applied with a watering pot or spray machine. The best way to use it is to mix one pound of paris green with one bushel of land plaster or air-slaked lime and sprinkle it on the plants when the dew is on them. I like this way the best because the use of either land plaster or lime is very beneficial to the foliage, causing it to remain green and vigorous for a longer period. If this can be done, it necessarily increases the yield.

The question of fighting the potato blight or mildew is a very difficult proposition. During the past season I tried Bordeaux mixture, using the formula as given in Bulletin No. 122, issued from the Ontario Agricultural College in Guelph in 1902.

Copper Sulphate (bluestone)	4 lbs.
Quick Lime (Fresh)	4 lbs.
Paris Green	4 oz.
Water	40 gals.

The bluestone and lime were dissolved in different barrels. I used an auto-spray and started as soon as the potatoes were nicely above the ground and sprayed every two weeks after till the potatoes were ready to be dug.

A Member.—If the soil is too rich the potatoes run to tops.

F. F. Reeves.—I never saw it. A crop of potatoes at Englehart had tops from six to eight feet long, but there were plenty of potatoes under them. I never saw a good crop of potatoes unless there were good tops.

H. Broughton.—We used a fertilizer last year and our potatoes had very small tops, but we got a fairly good crop of potatoes, notwithstanding the dry weather, and I think the reason why we had small tops was because we did not use as much stable manure. If we use potash and phosphoric acid in connection

with stable manure we will not get so much top, but we will greatly increase the crop. A commercial fertilizer over the manure builds up the land and gives you a balanced ration for the crop.

F. F. Reeves.—As long as I can get plenty of stable manure I always use it. I know you cannot get it in all localities. I have experimented with fertilizers for two years and have used all kinds that agents would sell me. We have so much fertility in the soil and are ploughing in such large quantities of manure that it is almost impossible to add to it, and I do not find commercial fertilizers of any benefit.

J. W. Rush.—I spent between two or three weeks in Parry Sound District looking into northern-grown potatoes in order to see what was being done. I sent forty bags to one of our members last spring, half of them being Early Ohio, and requested him to give them the very best cultivation. Last August he ploughed in an acre of clover, worked it up and disked it for this crop, and used some commercial fertilizer. He is an expert in growing potatoes and thought he was going to have a great crop, because we wanted the potatoes for the benefit of the Association. He planted the Deleware, Cobbler and a few other varieties on the ordinary clover sod without any commercial fertilizer, and they had such immense tops that you could not work between them; but the Ohio, to which he gave extra care and cultivation, and on which he used this commercial fertilizer, had very poor vines. He sent us some of the potatoes the first week in September, and the sample was very good. There is no doubt that the commercial fertilizer has a tendency to lessen the growth of the tops, but I believe it will increase the potatoes in the ground.

W. J. Kerr.—Mr. Owen, who has a garden west of the city of Ottawa, has a sandy loam soil, which is very moist and cold and inclined to be sour. He has grown potatoes for years, and always gets immense tops that completely cover the ground, but they remain green until quite late, and when he digs the potatoes he has very few. He has been using stable manure, and thought his soil was deficient in some constituent. I understand that tops are composed largely of nitrogen, but the potato itself is composed of potash and phosphoric acid. He put on a commercial fertilizer strong in these last named constituents, and, where used, there was a very much better crop of tubers.

F. F. Reeves.—Is not that owing to the difference in the soil? Some may have more potash than others. Ours does not need it.

H. Broughton.—One of the benefits we derive from the Vegetable Growers' Association in our branch since we organized three or four years ago is co-operation in getting supplies and in buying fertilizers. Some of the members wanted to go in strong for fertilizing, and I suggested that they should do it in an experimental way at first and see what their land required and the consequence is that now we get in from two to three cars every year, showing that the people are satisfied and are learning what the soil requires.

A Member.—What kind do you use particularly?

H. Broughton.—We buy the pure chemicals and mix them ourselves. I would not advise any gardener to buy them mixed.

A Member.—What kind of soil have you?

H. Broughton.—Sandy loam, and also clay loam; our potatoes are grown principally on coarse, sandy loam.

A Member.—One of the members of the London Association had a patch of strawberries last year that ran to tops. They grew a foot and a half high, but did not produce a very good crop of berries. He asked an agent if he could tell

him what he could do to help them and got the reply, "Use nitrate of soda." Now that would have cost him money and would have been an injury to him. He sent some of the soil to Guelph to get it analyzed, and they told him it had plenty of nitrogen but he could use to advantage some phosphoric acid and potash.

H. Broughton.—We use sulphate of potash and bone and acid phosphate. Acid potash is quicker than bone. Last year we got our supplies from New York, from Cove, Mortimer and Company.

SMALL FRUITS IN CONNECTION WITH VEGETABLE GROWING.

Prof. J. W. Crow, Ontario Agricultural College, Guelph.

You want this subject dealt with from the standpoint of vegetable growing. I cannot claim to have had any particular experience with growing small fruits in connection with vegetable growing; whatever I may know about small fruits has been learned in small fruit growing.

It is quite evident to anyone who has followed the discussion so far that the practice of market gardeners is, in a good many respects, different from that of fruit growers. Take for instance the matter of fertilizers. Mr. Reeves told us that he applied more than 250 loads of manure to 6 acres of land; that is 42 loads to the acre per year, and anyone will know at once that no small fruit grower uses that quantity of manure. As a rule vegetable growers use more commercial fertilizers than fruit growers. There is no more puzzling point than the profitable use of fertilizers. One of the most successful fruit growers I know of, a man who has got more returns than any other in the Province, does not use fertilizers of any kind or stable manure; he turns down an occasional green crop and that is all.

J. Lockie Wilson.—Why would forty-two loads of manure be too much for a small fruit grower to apply?

Prof. Crow.—I did not put it in that way. I stated that it was a good deal more than the small fruit growers use.

J. Lockie Wilson.—Would that be too much or would it require more?

Prof. Crow.—I want to get at that point more fully later on. I do not want to be understood as recommending fruit growers not to use fertilizers. The man I spoke of did not use fertilizers and he could not be induced to do so, but he gets good crops of fruit.

A Member.—What does he use?

Prof. Crow.—Nothing but brains in cultivating and pruning his trees. He is an expert cultivator and pruner and seems to make up in this way for the lack of fertilizers. He says his soil always had, and still has, plenty of potash, and tells me that for thirteen consecutive years he has taken off good crops of peaches without using any fertilizers.

A Member.—Don't you think he might have got much better results by using a fertilizer?

Prof. Crow.—He is satisfied with his returns. Every three years he turns under a crop of crimson clover in his peach orchard.

There is just one point in which your practice differs from that of fruit growers. We do not use anything like the amount of fertilizers that you do, and as to whether or not it would pay fruit growers to do so is a question I cannot answer. I would like to ask how many of you are growing small fruits in con-

Fruit and Vegetables.

nection with your vegetable garden business. From the number of hands held up it goes to show that these two lines go well together.

There may be cases where land is too rich to grow strawberries, but I doubt it very much, and I should think the land you have would be first class for growing them. They can be grown on any land, from sandy soil to heavy clay, or even muck soil, if the moisture conditions are right. It depends on the moisture more than anything else. If you can keep the moisture in sandy soil you can grow strawberries. I doubt if there are many cases where the soil is too rich for them, and the more manure a man uses on his strawberries the more money he will make. When I find a man in the fruit business who is investing money on fertilizers I can say that man is deriving a good profit from his business. I am not in a position to advise you on that point. Your experience, no doubt, has told you what is the best on that score, and I should be very glad to hear from some of you who have grown strawberries with success.

A MEMBER.—I had a crop last year of 7,000 boxes on a little less than an acre.

ANOTHER MEMBER.—One of our growers picked 13,841 boxes from an acre and a half.

C. W. BAKER.—We have picked 18,000 boxes off two acres. That is the best we ever did.

A MEMBER.—On the Experimental Farm they had 14,000 boxes on one acre. I understand 5,000 boxes to the acre is considered a good crop.

J. J. DAVIS.—I had a crop of 8,000.

H. J. SHARPLEY.—I picked 9,000 off an acre last year, and the ground did not appear to be very rich.

PROF. CROW.—It would pay to irrigate the strawberry crop. During the present season at Guelph, during the two weeks of hot weather, we used about 110 feet of the Skinner Irrigation Plant on part of our strawberries, and we got more than double the crop from the part where the irrigation system was used, and we could have done even better than that if we had taken more care of the plantation.

A MEMBER.—How often do you apply the water?

PROF. CROW.—On an average, two hours a day for about a week and a half or two weeks. It watered the lettuce crop and the strawberry crop at the same time and took in five rows of strawberries.

A MEMBER.—Was that an overhead system.

PROF. CROW.—Yes, perforated pipes. Our pressure is high, a good deal higher than the ordinary water system. We hope that by another year we shall be able to tell the quantity of water used. We certainly think it pays to irrigate strawberries.

A MEMBER.—Do you give any credit to a good mulch for retaining moisture?

PROF. CROW.—Yes, but a mulch to be effective has to be very thick. I have never been able to put on a mulch that I consider would be effective against ten days of very dry weather.

A MEMBER.—We had no rain during the whole of the dry season and my strawberries were mulched and the dry weather did not seem to affect the crop.

A MEMBER.—How thick would you recommend applying the mulch?

PROF. CROW.—Our practice is to apply a fair covering of straw and manure in the fall. I would not put on too much at that season, just enough to save the tops from freezing and prevent the heaving of the ground in the spring. I would apply the balance of the mulch in the spring after the ground gets thawed out

and would put it on thickly. I would prefer something finer than long straw, straw two or three inches long and about two or three inches thick put on between the rows and in the rows as well. We rake off the coarse part of the mulch in the spring from the row into the spaces between.

A MEMBER.—Do you run the scuffler through the mulch to loosen up the soil?

PROF. CROW.—It would depend on the soil. If it was light soil I would not do it. If your soil is inclined to be packed I would recommend cultivating before you put the balance of the mulch on and took the mulch off the row.

A MEMBER.—How would fresh horse manure do for a mulch?

PROF. CROW.—It would be all right, but I would want a good quantity of straw in it. At Guelph we get the manure from the Winter Fair. It is a mixture of manure from all kinds of stock, and we find it entirely satisfactory. There is a good lot of straw in it and it is not broken up very much.

A MEMBER.—One of the growers at Ottawa is using manure altogether, and he puts it on with a spreader in the fall after the ground is frozen, as heavy as the spreader will do the work.

PROF. CROW.—Where you use a mulch, unless you get something entirely clean, you can only take off one crop, because you get an over-running quantity of weed seeds, and it is almost impossible to clean up the plants. Before your crop is off, your plants are almost entirely covered. Someone mentioned 5,000 boxes per acre as an average crop. I contend that is not enough, and I do not think you can profitably grow strawberries if you only have five thousand boxes per acre. If you can get 10 or 12 cents a box it would pay you and there would be money in it.

W. J. KERR.—We get 8 cents on the average in Ottawa; $1,602.78 was secured by a lady from an acre of strawberries in Ottawa. I was at her place one day about one o'clock and her son had been to town with a thousand boxes of berries, and after he had his dinner he went in with two thousand more boxes, and they were selling that day for 11 cents. The only difficulty we have to contend with down there is that sometimes two or three carloads will come in from the West.

A MEMBER.—How do you get 12,000 boxes to the acre?

PROF. CROW.—In the first place I presume that the soil you have got is satisfactory, and the quantity of fertilizer you use is fairly well adapted to the strawberry crop, which requires rich land. The best growers I know of in the Province have the ordinary matted row system. The rows are three and a half to four feet apart and the plants are about two and a half or three feet in the row. They should be set out as early in the spring as possible, and the soil should be in first class condition for the strawberries to be set in the early spring. Part of our plantation was not spring ploughed, and you could see the difference in the plants between where it was spring ploughed and where it was not, simply because the soil was in better condition through the spring cultivation.

A great many growers cultivate both ways for a considerable time. Some in the Niagara District start the plants three and a half feet each way and cultivate both ways until along in June or July before they allow any runner to set. Then runners are allowed to grow, the cultivation being confined to one way and soon there is a matted row.

If labour could be had at a reasonable price it would pay to send a man over the plot and space the runners. Strawberry plants should not stand closer together than 4 inches, and I believe 5 is nearer right. It will pay you to take the time to cut out the extra runners, having them 4, 5 or 6 inches apart. If the soil is

very rich, you may have your row 15 or 18 inches wide. If it is not so fertile, 12 to 15 inches would be a fair width. With plants 5 or 6 inches apart you ought to get a good crop. In the early spring our practice is not to cultivate at all, but simply apply a mulch and allow the plants to come along without any further assistance. We only take off one crop, ploughing up the ground as soon as it is picked, and we have finished with them about the 20th of July.

A MEMBER.—Is there any disadvantage in cultivating when the plants are in bloom. I have heard it said that the dust destroys the pollen?

PROF. CROW.—I have never met with that in practice, and do not place much faith in it. Cultivating the soil when the plants are in bloom is all right if the ground needs it, but I would not go too deep. If the land began to dry out I should cultivate.

A MEMBER.—Would you apply a fertilizer the year you pick?

A Crop of Onions which Yielded $400 to the Acre.

PROF. CROW.—I would prefer to have the soil rich when I start the plants and would not use fertilizers until the crop was off; because in the condition that you keep your soil the plants will not suffer, because you have fertility enough there to grow a number of crops of strawberries.

H. BROUGHTON.—I planted strawberries in black muck and we had a splendid growth of plants and foliage, but did not get any fruit. I think it was because the land was deficient in potash.

THE PRESIDENT.—I have had experience in disturbing strawberry plants when in bloom. One year we were a little late in setting out the patch, and it was in bloom when we were getting our plants set out, and where we disturbed the plants the blooms did not set properly and gave a very rough berry. Another year we had a little footpath going up the garden along the side of one row and the berries that formed on that side were rough, and on the other side of the same row were a better shaped berry.

A MEMBER.—My experience has been exactly the opposite.

PROF. CROW.—We mulch heavily, and we find cultivating during blooming season does not do any harm. There are instances, of course, such as the President spoke of.

Now as to varieties, most of you are catering to different classes of trade from the ordinary strawberry grower, and I would not recommend an ordinary commercial variety to market gardeners. You are supplying the local market and want a berry that is better than the average in size and quality, and you are not so particular in regard to firmness and shape. The most largely grown berry we have is the Williams. It is not an extra heavy cropper, but is a very firm, solid berry and well shaped; in tasting quality it is good, and that is all you can say for it. It is not adapted for a strictly fancy trade, and I would not feel like recommending it to you. I should imagine you would want some such berry as the Glen Mary; it is a particularly large berry and one suitable to the fancy trade.

W. J. KERR.—The Senator Dunlop does well in Ottawa.

PROF. CROW.—That is a berry that you can no doubt dispose of to the fancy trade. You may have customers who will pay you an extra price for a good berry. The Semple is a good berry, and also the Splendid. It has a good, strong vine, but not as large as we would like. It is fairly early.

H. BROUGHTON.—The Tennessee Prolific seems to do well with us. We have grown it seven years, and it has always given good results.

PROF. CROW.—Parsons' Beauty is the best cropper we have and is hard and vigorous. It stands the winter and the wet.

F. G. FULLER.—I saw a patch of Parsons' Beauty at Guelph and was much pleased with them, and I would like to know whether they came to maturity.

PROF. CROW.—The dry weather struck that part of our plantation but they matured as large a percentage as any other variety. The Warfield has been a very heavy cropper in some seasons.

A MEMBER.—What variety do you find larger than the Williams?

PROF. CROW.—Glen Mary. Semple, Beltz and Uncle Jim are all larger than the Williams. We had a variety called the Buster that gave a very heavy crop, but I would not call it a good berry for the fancy trade.

C. W. BAKER.—We have the Glen Mary in this district, but the local papers gave me credit for having the best berry on the market, which was the Williams. I received this year 11 cents a box wholesale.

PROF. CROW.—Three W. S. or King Edward is a very nice berry, but it is not a good cropper. Parsons' Beauty as a commercial berry gave us the best results.

GOOSEBERRIES.

At the present time there seems to be quite a boom on in gooseberry growing. The canning and jam factories are paying good prices for the English varieties. Some of the canning factories have contracted for large quantities of these gooseberries at $1.25 per basket, and for the ordinary kind at $1.00 a basket, and it looks as though the business is going to be a decidedly good one. I know two or three instances where they are growing an English variety with great success. A grower sold them on the Toronto market this summer for $1.50 per basket, and says that there is nothing on his farm that does much better than gooseberries. Market gardeners have rich soil in good condition for this fruit. They do not require as much work as strawberries and they are not particularly hard to handle.

Mr. Whyte, of Ottawa, is a most successful grower, and I am told he has no trouble with mildew. Gooseberries require a cool situation, with plenty of air and moisture, and should be partially shaded. They will not stand an exposed situation or where they get the very hot sun. Mulching, I believe, is a splendid practice in gooseberry growing. I am inclined to think that heavy mulching right along year after year is the proper way to grow gooseberries; it keeps the ground cool and moist, and if they are planted in partial shade you have ideal conditions for gooseberries.

Black currants grow under similar conditions; they want a cool soil and close pruning.

F. F. Reeves.—How should I prune black currants, and when? They are planted six feet by five apart, and are in good ground.

Prof. Crow.—You will find a tendency to have too many shoots coming up from the bottom. The general principles of pruning currants and gooseberries are about the same. Black currants bear their best fruit on wood three to five years old. The branches start from the bottom and make growth the first year, and go on until they become what you call five year old, and, if you take an old branch and look closely, you can see the lines dividing each year's growth. The principle of pruning is to keep the supply of three to five year old branches, and when the branch gets five years old it is done and should be cut out right at the base, and you should have a four year old branch to take its place, and a three year old branch to take the place of the four year old one, and so on. You should leave enough strong young shoots each year to take the place of the bearing branches that you will cut out. When a five year old branch is cut out, a hole is left in the bush and a branch should be left to fill that up. This is the general principle of pruning. Gooseberries are pruned on the same principles, but they bear their best on three year old wood.

The President.—Do you practice shortening the tips?

Prof. Crow.—Some do. I do not know whether it is the best practice or not. If you are an expert it is all right, but it would be rather risky unless you were thoroughly proficient.

Industry seems to be the best; White Smith is good. You will not be bothered with mildew if you get the plants in the right position. Some of the growers are having the very best success with the English gooseberry by spraying them with lime.

F. F. Reeves.—Would it do to plant the gooseberries in the rows between the trees in the orchard?

Prof. Crow.—You could not have a better place. Plant your trees east and west and you will get the best shade.

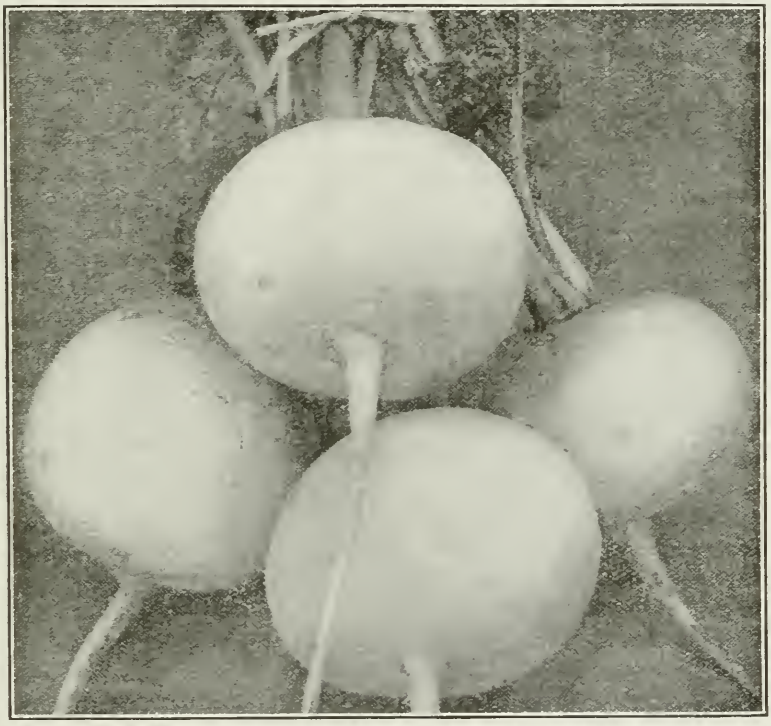
REPORT ON VEGETABLES AT JORDAN HARBOUR EXPERIMENT STATION.

A. I. Logsdail.

Owing to the sad and sudden death of Mr. H. S. Peart, Director of this Experiment Station, your Secretary asked me to write a brief report of the work we have been carrying on during the past summer along the line of vegetable experiments.

As plant breeder my own work has had but little connection with the testing of varieties of vegetables during the present summer months. For the past six weeks, however, this branch of the work has come directly under my charge, and in the following report I have briefly summarized the results of the experiments already completed and those still in hand.

In the greenhouse completed last year were planted in November three kinds of Tomatoes (two field varieties; the Central Experiment Farm strain of Wealthy, and Earliana; and one known to succeed under glass cultivation, namely, Ferguson O. K.). The vines were grown in the usual manner for glass cultivation. The Ottawa strain of Wealthy had given excellent results under field conditions,



Early Turnips.

but under glass the results were unsatisfactory. Several vines died (the nature of the disease that caused the death of certain vines was not determined, but further work along this line will be done again next spring), and the remainder averaged but 2½ lbs. of fruit to the vine. Earliana proved but little better, the vines showing a healthier growth, and a little heavier yield. Ferguson O. K. gave good satisfaction, no vines died, all grew vigorously, and had yielded over 8 lbs. of fruit per vine when they had to be removed to allow room for new crops.

The greenhouse was then utilised for raising 70 named varieties of field tomatoes, as well as some 2,000 seedling plants. About 20 varieties were selected for testing in duplicate, the two methods of pot-growing, and growing in a bed (up to the time of planting out in the field). At the date of planting the bedded plants had made somewhat greater growth than those grown in pots. All the plants were removed as carefully as possible, but during the following three weeks

the pot grown plants became established and made fair growth, despite cool weather; the bedded plants seemed to remain stationary. The fruit picked during the first ten days of August came from the pot grown plants only.

This experiment was not sufficiently conclusive to suggest the advisability of growing plants in pots, when one considers the extra expense, labour and care required to successfully grow a large number of pot plants. The factors influencing this experiment were: (a) The unsuitable construction of the greenhouse for this class of work, (b) defective heating, (c) lack of thoroughly prepared soil the previous fall, and (d) the necessity of considering other crops in the house at the same time.

The defects above mentioned require some explanation. In the first place, I consider a greenhouse in which experiments of this nature are to be conducted should be of a type of house largely used by the trade. A suitable one would be a span-roof house not more than 7 or 8 feet high, with ventilators on both slopes of the roof and sides, and heated by a 4-inch hot water pipe system. The steam heating in our greenhouse was inadequate; the small boiler being incapable of heating both greenhouse and buildings, and maintaining them at anything like a uniform temperature. A second boiler now being installed will, we hope, remedy this defect entirely.

Owing to the fact that one house had to be utilized for growing a fairly large variety of plants, anyone acquainted with greenhouse management will at once realize the impossibility of growing these plants under really favourable conditions. This experiment will be carried on again next spring, when several of the factors which previously had hindered the work will have been remedied.

About thirty varieties of Musk Melon were started in the greenhouse. Old strawberry boxes were used as pots, by which means the young plants were given ample root room.

The boxes were half filled with soil, and two plants allowed to grow in each box. The deterrent factors previously mentioned greatly influenced this experiment also; nevertheless, the field conditions of the plants indicate that a considerably greater portion of the crop will be harvested before frost than has been the case in the two previous seasons.

About 59 varieties of Peas were tested for yield. These were sown in a row about 6 inches broad, and have given better results than the previous sowings in narrow rows. The rows were 50 feet long and the plants were thinned to 150 plants in a row, to ascertain as accurately as possible the relative yield of peas per plant.

The following list includes 20 of the heaviest yielding varieties, 5 Extra Early, 5 Early, 5 Mid-Season, and 5 Late, Abundance, a Mid-Season variety, giving the greatest total yield.

PEAS, 1910.

(a) Premium Gem	138 oz.	(c) Abundance	188 oz.
(a) American Wonder	116½ "	(c) Lincoln	164 "
(a) Rennie's Best Ex. Early	92 "	(c) Senator (Burpee)	158 "
(a) Alaska	91½ "	(c) Burpee's Quality	147 "
(a) Lightning	89½ "	(c) The New Leader	136½ "
(b) Burpee's Quality	142 "	(d) Yorkshire Hero	165 "
(b) Little Marvel	137 "	(d) Heroine	162 "
(b) Bruce's Royal	107 "	(d) Dwarf Telephone	158 "
(b) Little Gem	102½ "	(d) Rennie's Fill Basket	154 "
(b) Notts. Excelsior	101½ "	(d) Champion of England	151 "

a. (Extra early.) b. (Early season.) c. (Mid-season.) d. (Later.)

In connection with this experiment and the plant breeding work, a short row of each variety was grown for seed. The seed thus saved of each variety will be sown next season, beside similar seed procured from the seedsmen. By this means it may be ascertained to what extent, if any, varieties of peas may be influenced by the proximity of other varieties to them, and whether they will continue to grow true to type when grown from seed for several seasons in a locality very different to that from which the seed was originally procured.

Similar work is being conducted with the numerous varieties of tomatoes grown on the farm. This experiment is not yet completed.

About 30 varieties of Beets were tested this year, and the following list includes those which proved to be the best.

BEETS, 1910.

Name.	Total yield without heads.	Total yield.	Colour.
Whiteham Fireball	32 lbs.	45 lbs.	White
Philadelphia Turnip	29 "	43 "	"
Lentz Ex. Early Blood Turnip	11 "	17 "	"
New Intermediate	30 "	43 "	Dark Red
Rennie's Globe	27 "	39 "	"
Rennie's Intermediate	24 "	39 "	"
Rawson's Arlington Favorite	24 "	35 "	"
Long Dark Smooth Blood Red	21 "	44 "	"
Crosby's Egyptian	15 "	21 "	"
Improved Blood Red	30 "	43 "	Light Red
Albano or Market Garden	26 "	31 "	"
Crimson Globe	24 "	30 "	"
Simmers' Ex. Early	23 "	36 "	"
Improved Blood Turnip	22 "	33 "	"
Swiss Chard	21 "	33 "	"
Early Yellow Turnip	17 "	31 "	W. Yellow.
Early Yellow Turnip	15 "	29 "	"

The experiment with Lettuce included over fifty varieties; the soil and location was not what it should have been, nevertheless, the following nine varieties gave good results:

LETTUCE, 1910.

Name.	Color.	Flavor.	Form.	Size.	Total yield in oz.
Deacon	Green	Indef.	Head	Large	16 Early
Mignonette	Copper	Sweet	Loose	Medium	16 "
Iceberg	Yellow	"	"	Large	15 "
All Year Round	L. green	"	Head	Large	40 Mid season
Gold Prize	"	"	Loose	Medium	32 "
Salamander	Green	"	Head	Large	19 "
Express Cos	"	"	"	"	64 Late
New Red Cos	Copper	"	"	"	64 "
Balloon Cos	Green	"	"	"	56 "

Experiments in Beans, Carrots, Potatoes, Tomatoes, Muskmelons and Sweet Corn are not yet completed, but a full Report will appear of these crops as well as of those previously mentioned in the Annual Report.

In conclusion, may I suggest a line of work which to my mind requires more thorough investigation than that of testing year after year a large number of varieties, many of which are practically indistinguishable from each other. The line of work to which I refer is that of *testing the comparative values of the several methods employed in growing certain vegetable crops.* In countries where such crops are grown extensively, several different methods are often employed, and possible combinations of the best features of these different methods might be attempted, and their comparative values estimated.

Such work would necessitate the services of an expert. If a reasonable salary were offered and sufficient moral and practical support given such a man, he could easily be procured, and I feel sure that the results from such investigations would more than repay the increased expense and annual upkeep.

First Prize Asparagus—30 Stalks in 3 Bunches. Weight, 8 lbs. 9 oz.
Grown by Chas. McKay, Doncaster.

I suggest this line of work because after several years' practical acquaintance with commercial gardening as a journeyman gardener, I feel convinced that there are many wrinkles of the trade that might materially assist this important branch of agriculture, if given a fair trial in the hands of an experienced gardener. Such work might advantageously be developed along any of the following lines: The raising of early vegetables by the use of frames and pit houses. The very intensive system of French suburban gardening especially suited to large cities. The relative value of commercial fertilizers and manure under certain conditions or during certain seasons of the year.

The business of raising successfully a series of crops each year is becoming more and more of a science. Botany and entomology periodically alarm us by

the discovery of a disease heretofore unknown, or an insect whose ravages had not previously been noticed; yet through these selfsame sciences we are obtaining yearly a more intelligent knowledge as to the best means of controlling either a dread disease or insect scourge. These allied sciences are advancing rapidly, but it is doubtful if horticulture as a science is advancing as rapidly in its own sphere.

Horticulture as an art is indeed old, but as a science it is yet young, and much elementary work awaits investigation.

THE PRESIDENT.—The Jordan Station is conducted by the Government for the purpose of making experiments that would be of value to the commercial grower, and it is for us to make suggestions as to any work that would be of advantage to us.

PROF. CROW.—I am sufficiently familiar with the experimental work done there to make a few remarks. In the latter part of the report certain work is outlined, and, if the vegetable growers of the Province expect experiments to be carried on which will be of value to them, they should come to some conclusion as to what desirable experiments they would like to take up. There are some definite subjects mentioned there for experimental work.

THE PRESIDENT.—There are three suggestions, the use of frames and pit houses and the intensive French system.

F. F. REEVES.—If we take these three suggestions in bulk we will not make a mistake, because these are burning questions with us, and, if the Convention would pass a motion recommending them to the Department as work which could be profitably taken up, it would help not only Mr. Logsdail but us materially. I move that the following be lines of work to be experimented on next year:

"The raising of early vegetables by the use of frames and pit houses. The very intensive system of French Suburban Gardening especially suited to large cities. The relative value of commercial fertilizers and manure under certain conditions or during certain seasons of the year, and that, owing to the character of the hot houses that are being put up in this country, the construction of the new public building at Jordan Harbour Experimental Station should be of the latest improved type of construction."

FRANK WHITEHALL.—I second the motion, particularly that part referring to growing under glass. Some of you know how expensive it is to do this, and, if we can get the Government to carry on some of these experiments for us, we should be greatly benefited.

F. F. REEVES.—If there is a printed report sent out by the Jordan Station every member of this Association should have a copy of it.

J. LOCKIE WILSON.—The report claims that the hot houses are not suitable for the work and not properly heated; they should be built after the very best type and according to the latest approved design. Now that the Government have arranged for the building of a Station at Vineland it is expected that a number of growers will visit the farm, and those who go to Jordan Harbour should see the most improved type of greenhouses.

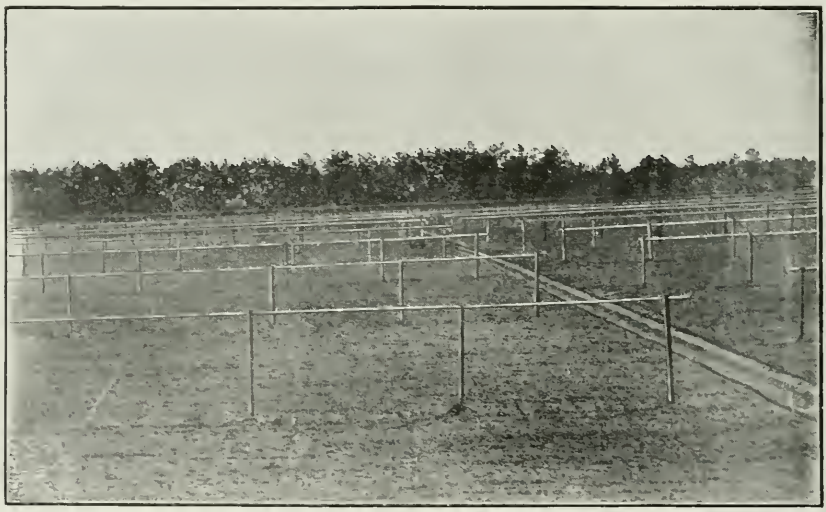
THE PRESIDENT.—We must give Mr. Logsdail credit for his excellent suggestions. He says the greenhouses were not properly constructed for the work they were doing, and I agree with Mr. Wilson that we certainly want the best.

The President, in introducing Mr. Coles, stated that there were some of the Skinner Company's plants in operation near London.

IRRIGATION IN GARDEN AND GREENHOUSE.

W. H. Coles, Troy, Ohio.

Irrigation is not a new question. In the western part of our country we can find irrigation systems that existed before that section was settled by its present population. They are in decay and almost destroyed. The growers throughout Canada and the United States and other countries are coming to realize that competition is so fierce that they have got to make the most out of their products in order to meet competition and secure the best results. Your President asked me if I had brought some samples of irrigation plants, and I had to confess that I had not, because I had a little bit of hesitancy how to approach this subject, and I thought it was hardly fair for me to come here and try to lay out the Skinner System of Irrigation in the same way as our salesman would in trying to sell



Showing Distance between Pipes.

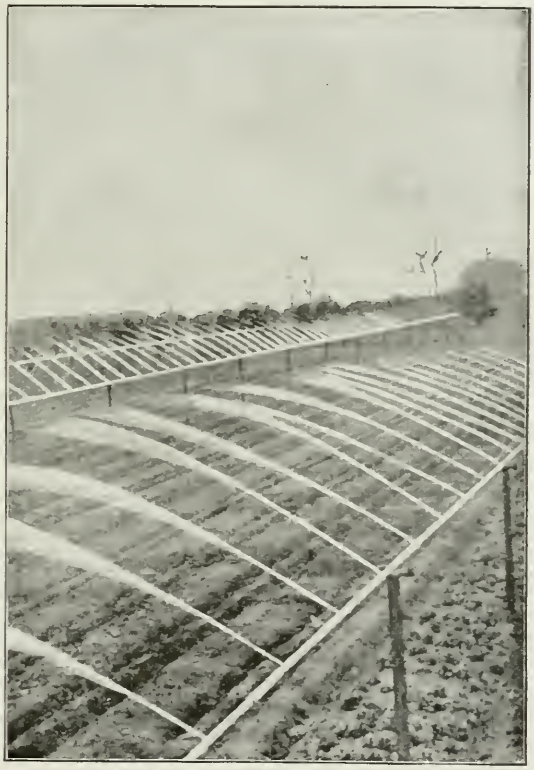
you an equipment. It really looked to me that the most advantageous thing I could do would be just to lay before you some of the problems that you have to face in the question of irrigation.

There is one fact that you cannot dispute, and that is that the air as well as water enters into the growth of the plant. We also know that the soil is not made up of a solid mass but of particles laid together with air spaces between, just the same as if we magnified the soil it would be more like a box of oranges, and authorities say that fifty per cent of space in the soil is air; that is, there is only fifty per cent. of what is apparently soil occupied by solid matter. That bears on the irrigation system in one particular, and that is the capacity of that soil to hold water. I have tested this very extensively and have found that soil will hold water by saturation to a great extent before it will run off.

One hundred pounds of quartz sand will hold 25 pounds of water; 100 pounds of calcareous sand will hold 29 pounds; 110 pounds of loamy sand, 40 pounds; 100 pounds of clay loam, 50 pounds; 100 pounds of clay, 70 pounds. Some soils will hold as high as one hundred pounds. It will hold as much water after

saturation as actually the weight of the solid matter in the soil. We found that an equivalent of an inch to an inch and a quarter of rainfall is evaporated from the average soil in the course of the growing season.

The next question is percolation. A professor at Wisconsin University saturated an eight foot column of sand with 25 to 30% water. In less than twenty-four hours he found less than two-thirds of the water had percolated out of that sand. In four days there was left about 6% and a fraction of water in that sand. In sands of various degrees of fineness, in four days, there was left from 6¼ to 13½% of water. In nine days there was only a little less, but there was not enough water left in the top half of the column after 24 to 48 hours to continue plant growth. We find that you can saturate the soil, and the next question is the disposition of the water.



Skinner System at Work.

Evaporation and Percolation.

One man tested his soil, which was a sort of clay loam, with a clay sub-soil. At four feet it turned to sand, and the water was about seven or eight feet below the surface. It is not necessary for me to go into details, but I will simply say that on one test the first foot of soil contained about ten pounds of water, the second foot seventeen pounds, the third foot fourteen, the fourth foot ten, and the fifth foot seven, and that is the least we have. The top foot has only a limited amount of water, which increases or decreases slightly down to the fifth foot, and from there it increased until we get to the water table. It had twenty-two pounds

of water in the first foot above, the water being drawn up there by capillary action. At the end of the growing season it was practically the same, only the water table had gone down a little bit.

Now, then, we have the location of the water in the soil and the various motions or dispositions of the water.

Where Plant Growth Stops.

This test has been made on various kinds of crops. I have taken one made of clover. In clay land when saturation gets down to 8⅓, that is, when there is 8% as much water by weight as there is soil, the growth stops absolutely. In red clay this is 12.41, in sandy clay 13.52, in sand 9.35%. You have seen the effect that percolation and evaporation have on the soil, and where we reach the limit of the possibilities of growth.

The next thing I want to consider is what the water does when it gets into the soil. Professor King states that one acre foot of ordinary sand contains 4,000 pounds of phosphoric acid, 16,000 pounds of nitrogen, lime, magnesium, soda, sulphur and other substances soluble in water. One of the greatest effects water has is simply dissolving in itself salts—just as we pour salt into a cup of water or dissolve a pill—in order to make it available and of use to the plant tissues. In order to be most effective it has got to dissolve enough of the plant food to be available, suitable and sufficient for the plant itself, and there we run across another phase of the question, and that is how much water. If we put too much water we dilute these soluble salts, and, as one man has put it very aptly, it is just the same as diluting the bouillon to feed to a child. It takes a lot of it but does not thrive because the solution is not strong enough, and it takes too much water in the plant in order to secure the required amount of food. If you put too much water on, the chances are it will go somewhere and carry the plant food with it.

There is another proposition, and that is the question of chemical action. The oxygenization or chemical transformation in the plant is more active when the atmosphere or soil or surroundings are moist. There is another phase of the question. The germs which act on decaying matter turn them into ammonia, and ammonia into nitrous acid, and that into nitric acid. These are all more active when moisture is present.

The plant has got to have not only water but air, and when we appreciate how much air a plant requires and how much water the soil will hold, we see we are up against a proposition of danger of too much water just the same as the danger of too little water.

Our experience has been that the tendency is to water too much, and the gardener has to learn that from experience.

As regards temperature, it requires as much to raise water 10 degrees as to raise sand 52 degrees, clay 44 degrees, humus 23 degrees. Then there is the question of evaporation. If you hold up a thermometer and another one with a damp cloth around it, you will find the thermometer with the damp cloth will go down 20% lower than the dry one. That is due to increased cold caused by the evaporation. These things all enter into the question of how to water.

It will be readily understood, however, that soils with excessive moisture are cold soils, for the reasons above indicated, and when it is recognized that germination or growth stops when the temperature of the soil is reduced to approximately 45 degrees Fahrenheit, and when it is recognized that in some cases germination

at 72 degrees soil temperature in 3 days equalled the germination through a period of 16 days under similar conditions, except that the soil temperature was reduced to 60 degrees, one can readily appreciate the effect which an undue amount of water in a soil may have upon the growth and maturity of a crop, simply because of the effect which this water has upon soil temperature.

I have tried to bring out the fact that the application of water must be carefully studied and thoroughly controlled; that too much water is objectionable, as is too little water; that the conditions must be carefully studied and determined; and that the water supply must be under sufficient control to permit of its correct application.

We have an old Irishman in our town. He went up to the bar in the hotel and called for a glass of beer. The bartender set down the glass of beer, and then the Irishman said he wanted a glass of whiskey. The bartender brought the glass of whiskey and set it alongside of the beer, and the Irishman took the glass of whiskey and dumped it into the beer, and when he had drank it the bartender looked at him and said, "Why did you do that?" The Irishman said, "If I drink beer and nothing but beer, I get full before I get drunk, and if I drink whiskey and nothing but whiskey, I get drunk before I get full; and so I put my whiskey and beer together, and I get drunk and full at the same time." And it is a little bit that way on the question of too much or too little water. You have got to have an equilibrium between air and water, and that must be determined absolutely by conditions in the soil and the crop you are growing. As to the amount of water used in the plant, Professor King says in the green growing plant that pea-stock absorbs 80%, turnips 92%, beets 86%, red clover 79%, and white clover 81%. As a matter of fact, I cannot think of anybody who has merchandise to sell which is watered more strongly than yours.

The plants breathe moisture just exactly as people transmit moisture through their lungs. The most effective test in order to tell whether a person is dead or not is to hold a clean mirror in front of their mouth to see if any moisture collects.

For every pound of solid matter that is added to the plant barley takes up and dissipates 464 pounds of water, oats 593, maize 270, clover 576, peas 477, and potatoes 385. From 300 to 500 pounds of water are absorbed by a plant for every pound of solid matter that is added to its structure.

Another man measured the humidity as a slow breeze passed over a field of clover in the prime of growth. He found the humidity of the air was increased nearly 50% as it passed over that field of clover, and that shows the amount of water that is absorbed.

In these facts that I have given you we have found, first, the relationship of water to the soil in its physical condition, and then the action of the water on the soil, such as absorption of salt and the chemical actions and the effect of the temperature, and how much and what quantity of water is used by plants in their growth.

There are, of course, other uses for water, but I will not discuss them until we take up the question of the various methods of applying water.

I have put before you these few facts in a way that can be substantiated, showing you the necessity for the use of a very considerable amount of water, and especially the necessity for the correct application of it. Excessive water is as injurious as too little. That being the case, we have problems which must necessarily be worked out in each locality.

There is considerable difficulty in getting detailed information in relation to the growth of plants under the Skinner System. It is only after carefully sifting out that we are able to tell just exactly what causes certain results.

We have a case now in Florida where celery crops grown under our system matured two weeks before those grown under sub-irrigation. We know these facts exist, but we cannot tell whether they are due to temperature conditions or the more effective distribution of water. As a matter of fact, we closed up a contract for an experimental farm of our own. We went to the south of Jersey and bought some land, and have decided to go into that subject ourselves and get first hand information.

Problems in Canada are different from those in the United States. When it comes to putting on the water, the most effective time, the amount of water to use, and the various problems of that kind, have to be worked out for each individual locality.

Our system of irrigation consists of laying pipes, and the size of the pipes depends altogether on the length of the line. We publish in our catalogue tables showing the diameter of these pipes for the different sized lines. They are usually put 40 to 60 feet apart. In each pipe are nozzles every 4 feet, with about 210 to the acre and they distribute about 40 gallons per minute, which equals an

Inside Sprinkler.

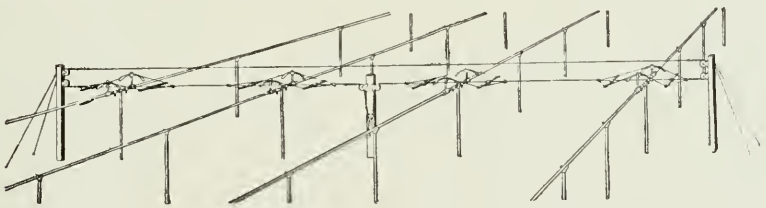
inch of rainfall in between 11 and 12 hours. We aim to get as slow a distribution of water as possible, simply for the reasons that I have given you before. We want the water, but we do not want it distributed in such abundance that it will affect the temperature or aeration of the soil. Our primary purpose in distributing it slowly is that watering every other afternoon for a week equals an inch of rainfall. In Florida they water from three to seven in the afternoon every other day when their crops require the most water, and they distribute an inch of rainfall in a week.

The cost of our system is somewhere from $75 to $125 per acre for the equipment in the field. Each line has a special device for turning, and that enables us not only to turn the pipes but to turn them against packing, so that the thread won't wear. We also have a handle, and the pipes can be connected up in unison if desired. The position of the plant is changed four times in watering. We can rotate the pipes on 20 acres from one central point. In the South they have from 10 to 20 acre truck farms, and we have equipped them so that they can turn 10 acres from one point. They generally turn it from the engine house two or three times an hour.

Recently we ran up against a proposition of frost protection, and found it was necessary to rotate the pipes every two minutes.

Now we have a machine for rotating the whole of twenty acres from one central point which is absolutely automatic. We have also put a heater in some of the equipments for raising the temperature of the water, so we get additional frost protection. About 10 degrees of frost is all they have in Texas in the Rio Grande Valley. We do not pretend to protect against 6 or 7 degrees with ordinary cold water, and in order to get down to 3 or 4 degrees we have put in the heater. We have also devices for spraying the field with fungicides or commercial fertilizers, and have sprayed six acres with paris green in less than five minutes. We mix the compound in a barrel and force it up in a pump.

We recognize that the question of irrigation is one that means a great deal of study and experiment, and though our purpose is not to solve the problem of the individual grower, it is to supply a system of irrigation that will eliminate labour and enable the grower to put on the soil the necessary water at the time he requires it and in the most effective way. We distribute it slowly, practically eliminating all labour, cover every inch of soil and distribute it with absolute uniformity. We can water sand that cannot be watered by sub-irrigation. We try to give the water supply in the form of a general rain. This is absolutely at the command and under the control of the operator.



Outline of Portion of Skinner System.

We can give you information on matters of growing from the experience of others, and we most frequently refer prospective inquirers to some grower similarly situated. We furnish water in the most convenient form and under absolute control, so if you want a little water for spraying you can get it, and if you want a large quantity and to run the machine for three or four days at a time you can apply it with the least labour and greatest efficiency.

I found an interesting fact, that the condensation of the atmospheric moisture into dew liberates a vast amount of heat. In condensing from vapour into water a pound of dew liberates enough heat to raise five pounds of water to the boiling point. Also a ton of water crystallized into a ton of ice would liberate enough heat to raise an equal amount of water from 32 to 112 degrees. In frost protection we distribute water over every inch of the soil, and over every plant, and do it continuously. The pipes must be rotated at least every two minutes. It simply means that every leaf and every particle of the ground is getting from the water which is liable to be frozen into ice a considerable amount of heat. By keeping that water constantly free and thoroughly distributed there is a constant amount of heat distributed over that field, which prevents the temperature going below 32 degrees. In ten acres of our equipment we distribute about a ton and a half of water, and by that means we are spreading a whole lot of heat.

We all know that groves and farms that are near large bodies of water do not freeze as quickly and are not as liable to frost as those further away from the

water. There is a little strip in Florida between the Indian River, which is a branch of the Atlantic Ocean and a fresh water stream, and that land is very valuable because it does not freeze as early as the rest. We have protected celery when the temperature has been as low as 12 degrees. That was done for five nights, preventing it freezing, and we have protected beans against 26 degrees. Lettuce, celery, cabbage, etc., can be protected against frost very easily. I was in Florida last winter where they had about five degrees of frost. They had a great variety of plants, and everyone who had our system used it. One very prominent grower there is opposed to watering plants during the night. He sprinkles the ground well and turns the water off, and on 200 acres where our irrigation plant was used there was not a crop that was injured. It has been demonstrated beyond a doubt that you can prevent frost by this means and the only question is the maximum limit of cold against which we can protect.

We are putting a plant in Texas this winter, and we hope in the spring to have some very valuable information as to what we can accomplish with that equipment.

In greenhouse work we use a different nozzle altogether. It has a sort of fan-shape spray, so as to give a fine mist at short range. In some plants we put in large nozzles, but it requires a greater pressure. We insist on a fine mist because we know that gives much better results than water which beats on the soil and hardens it.

The question of the red spider is one which we want to get information on. Some say we can protect against red spider by the use of a hose, and others say you cannot. There is no doubt that moisture has some very effective results, although it may not absolutely prevent this insect.

THE PRESIDENT.—What pressure do you require?

W. H. COLES.—In our out-door system about 20 pounds pressure. It will operate from 15 to 40; preferably from 20 to 35 pounds. When we get more than that we are getting a mist so fine that the wind blows it away. In the greenhouse nozzle about 35 pounds pressure is best; when we get up to 60 the mist is too fine. It will operate at 10, but we prefer from 15 to 30.

J. LOCKIE WILSON.—What horse power is necessary?

W. H. COLES.—Under ordinary conditions, 3½ horse power for the acre. A five acre plant requires five to ten horse power; twenty acre plant requires twenty-five horse power. There is less horse power required in a larger acreage. We very seldom attempt to operate with under 3½ to 4 horse power.

A MEMBER.—How much would an engine and your system cost for working 25 acres?

W. H. COLES.—That is a hard question to answer. A plant on 25 acres would cost you in the field about $100 an acre. The most expensive plant we ever put in was on six acres, where we put in everything. We had 600 or 800 feet of a line and pumps and engine and full equipment and automatic turning and spraying apparatus and wind brakes, and it cost about $375 an acre. Figuring on a 20 acre piece I would judge that under ordinary conditions it would cost about $200 or $250 per acre.

A MEMBER.—Would that be prices we get here or in the United States?

W. H. COLES.—The part we furnish is comparatively small. We only get about $25 an acre out of the whole business. There is the question of pipe and pumping outfit, on which you have to pay a duty of 30%.

THE PRESIDENT.—There has been some talk about installing one or two in Toronto. We have gas engines that we have used for pumping into the tank. Would not that do if the engine pumped directly into the line?

W. H. Coles.—We do not advise a tank unless the conditions call for it. You could put in a deep well pump, and use an artificial compression tank of 30 gallons that costs about $5.00, and that is large enough for a single acre, and you could pump into that and get every advantage that you would get in an elevated tank, and it would be much cheaper. It takes a big tank to be of any use. All of the systems that we have installed use piston pumps. As far as possible we use centrifugal pumps on the larger systems, and pump directly into the system or compressed tank. We do not advise the use of an elevated tank.

A Member.—Would it be necessary to have a pressure gauge or safety valve?

W. H. Coles.—Some use a little by-pass valve. The Standard Engine Works at Cleveland build a very good pumping outfit, and they have a by-pass valve so that when your pressure gets up to a certain point the water runs back into your

Monster Squash Weighing 194 lbs.

well. You can get that on the engine from these people, or you can get the by-pass valve on your lines.

F. F. Reeves.—In running a pipe 400 or 500 feet long, would you reduce it when you got to the further end, or run the same size pipe all the way through?

W. H. Coles.—That is all figured out on these bulletins. I offered a prize to the man who would write us a letter that would give the most information, and we got seventy of them. They are pretty comprehensive, and are contained in these bulletins. We also give tables of the amount of water distributed, and the distance between the nozzle friction, etc.

A Member.—Would an elevated tank 35 feet high give sufficient pressure?

W. H. Coles.—It would, but it would not give you as fine a spray as you would have with the higher pressure. In some places the ground gets hard and the water lies on top of it, and the sun reflects on the water and scalds the plant. J. R. Davis, of Bartow, Florida, is the best grower in the South. I was out to

his place last winter about nine in the morning and he was watering cabbage, and he kept watering right through the day and he says the sun does not affect them at all, but other men down in that locality say they would not think of watering through the heat of the day.

J. Lockie Wilson.—If this Convention is satisfied that the system is a good one it would be a good idea to ask the Department of Agriculture to install one at Jordan.

W. H. Coles.—I have been asked whether it is necessary to strain the water when it is very dirty. We put in a squirrel cage of perforated brass and that keeps out the dirt.

The President.—In dry seasons how much water would you have to put on the land in order to do any good?

W. H. Coles.—Professor Rolph says in Florida they take almost unlimited water, but an inch a week is the general maximum. We try to run our system so that in extreme seasons you can operate four hours in the afternoon every other day, and get an inch of water in a week. In ditch irrigation they figure on about 21 inches of rainfall during a season of 100 days. Our system does not require half the water that you do with the flooding system, because we distribute it more uniformly, and it is more effective.

A Member.—In your system is there any loss of moisture by evaporation?

W. H. Coles.—We have had this question asked, What is the comparative loss by evaporation, and we had planned to find that out and thought we were going to get that information, but we did not get it. We lose, probably, more water by evaporation in the air, but we do not lose as much water in that way as through evaporation through the capillary tubes in the crust of the surface soil. In Texas they charge $10 a year for the season, and one man using our system gets a flat rate of $5 a year, and we know that we do not use as much water as they do with other systems. Some of our plants are fed from the municipal water system, and in that case you do not require any engine.

I appreciate the interest you have shown, and we recognize that the service we can render to the growers is going to mean more to us than anything else we can do, and we do not want you to look on us as trying to prey on your pocket-books, because we give you a return for it. If in the course of your meeting you pass a resolution recommending the Skinner System to the Government, we as a company would be glad to establish free of cost such supplies as may be used in running a plant of that kind. We are always glad to do that, because we want the co-operation of the people who are working at the same problems that we are.

W. J. Robb.—I move that the Department of Agriculture be requested to install the Skinner System of Irrigation at Jordan Station, in order to demonstrate its practicability.

F. G. Fuller.—I second that. It would be of great interest and profit to those who visit that station.

Motion was carried unanimously.

W. H. Coles.—In order to get the matter on record, I would formally tender through this Association to the station at Jordan Harbour such supplies as we manufacture that may be desired for the installation of the Skinner equipment. We will furnish same without cost, and as compensation we would expect to receive such information as they may gather on the irrigation problem.

MELON CULTURE.

F. G. Fuller, Hopedale.

Melon Culture is becoming a great feature in the market gardener's crop at the present time. The demand for good melons has grown so rapidly during the last few years that the market gardener finds it a profitable crop to grow. There is something about growing melons that a man can take an interest in, and he gets some satisfaction when he can grow good ones. The first thought should be as to what variety of melon will suit your market. Some markets demand a large, others a smaller, melon. In our market the large melon is in demand, and you can sell any number of them. When I was in Hamilton last fall, and also in Toronto, I saw very few large melons, and the demand seemed to be for smaller ones. The next thing to consider should be seed selection. If you want to grow a good crop you must have good seed. I would advise all growers to save their own. Select a melon of good type, and before you save the seed of that melon, sample it as to its flavour, and don't by any means save the seed of a melon that has not a good flavour. A good looking melon is not satisfactory unless you have some flavour with it, and if you keep selecting for flavour you will get it. If you have not a melon of your own, purchase one from some good grower, and get your seed in that way.

As our season is short, we start the plants in hot-beds. If we plant the seed outside the crop is too late, and the early frost catches it.

Preparing the Hot-Beds.

We start these between the 25th of April and the 1st of May. Sometimes we use hot-beds in which we have grown a crop of lettuce or radishes, but we have found that is not always satisfactory, as the beds in some instances are too cold, and if the weather is cold the seed is likely to rot. The most profitable way is to put up beds on purpose for your melon crop. Some grow them in the greenhouse, but I have never been successful in that way. We put up the hot-beds with about ten inches of hot manure well tramped down. Make up the hot-bed the same as you would for any other crop, but be sure to tramp the earth in before you put in the seed. Put four or five inches of good earth, soil well pulverized, without any lumps or hard substances in it. After you have it well packed down mark it with a six-inch marker both ways. At each cross mark take an ordinary teacup or anything that shape and press it into the mark, and that will make a hole in the ground about an inch deep, and we place four or five seeds around that outside edge, and then cover it with fine earth and pack it down with a spade or something, and then water. We watch the beds closely during the time the seed is germinating and coming up, to see that it gets air enough, and plenty of water. The seed will come up in one week. If it does not, the chances are you will not get a good stand.

J. W. Rush.—Do you find four inches of soil sufficient on that hot manure?

F. G. Fuller.—Yes. If you have too much, when you come to take out the plant you cannot get the required manure along with the earth to hold it together. We have tried planting in berry boxes and in sods, but it does not seem to be as satisfactory with us as planting in the earth, and cutting out in squares. After your plants are up, care must be taken that you do not get them too spindly. Give them plenty of air, and during warm days take the glass off for a few hours, but in no case allow the glass off when the weather is cold or damp and wet. I

learned that lesson this spring. From carelessness I lost the greater part of my plants. We had a lot of cold weather and our plants were growing too rapidly, and the glass was taken off, and we lost the greater part of them by fungus growth.

With regard to selecting soil for melons, a southerly slope is best, and, if possible, it should be well sheltered from the winds, and the soil should be of a rich, sandy loam, although we have grown melons very successfully on gravel land, but loam is much better, and will give more satisfaction. You cannot get the loam too rich to grow melons, although I have heard it said that you should not have the land too rich, because your crop will all grow to vines. I have tried it, with the result that I did not get many vines or many melons, and the crop was almost a failure, and I am convinced that the melon wants a very rich soil, and one that is warm and has had good cultivation.

After you have selected your land and your plants are ready to go out, then you should see that your land is well worked. It should be well cultivated during the spring and pulverized for a depth of about five inches; when you have it in that shape you are ready to mark your land and to set out the plants. We take a six-foot marker and mark the land both ways, and then we plough out a furrow the longest way of the field. We take out squares of earth with the plant and cut about an inch of manure along with it, and place these in trays and haul them out to the land on a spring waggon or bob sleigh. A bob sleigh does not shake the plants too much, and it is low and makes it easy to handle them.

After the plants are set out start the cultivator going both ways and get the land levelled down. Melons, like other crops, require frequent cultivation to keep them free from weeds. About a week after your plants are set out give them an application of nitrate of soda. This is very important; it gives the plant vigour and makes it healthy, and it will more easily withstand the blight.

A Member.—How do you apply that?

F. G. Fuller.—Put a couple of tablespoonfuls around each plant and give the plants two or three applications. I do this ten days apart. We usually plant the melons in the ground from the first of June to the tenth. Nothing hurts a melon more than a check by wet, cold weather, and it is not advisable to set them out unless the weather is warm. A melon plant will check easier than a tomato plant. A year ago we planted half of our melons on the south side of an orchard the other half of which was more exposed to the wind, and the plants that were protected did the best. That shows that they require to be sheltered from the wind and kept as warm as possible.

The striped bug is troublesome; it can be checked by dusting the plant all over with land plaster. We do not try to kill the bug, only to scare it away. It is easier to check it on melons than on cucumbers or squash. We have been troubled with wilt, but not for the past two years. Two years ago we had a piece in the centre of our field that died out completely, and the rest of the field was not affected. We simply scraped the melons and everything that was on that piece into a heap and kept this away from the rest of the plants, because we believe it spreads. I never tried air-slacked lime for the striped bug. I tried paris green and soot.

A Member.—I tried paris green and soot, and then I tried air-slacked lime, which I thought would kill either the blight or the squash. I applied air-slacked lime when the dew was on in the morning, and that fixed them.

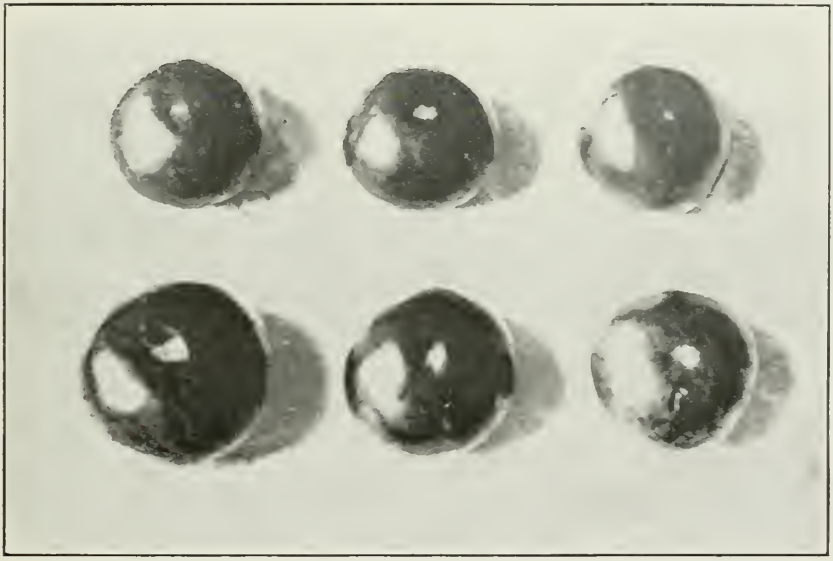
H. B. Stein.—As long as you keep the leaves covered up with something, the bugs will not attack them.

J. W. Rush.—You do not use the land until you put in the melon vines in June?

F. G. Fuller.—No.

J. W. Rush.—How many plants do you put in a hill?

F. G. Fuller.—We try to thin out to about two or three plants. We sow four or five seeds. It is not advisable to leave too many plants in a hill. I have seen some cases where one would give better results than two or three. Another thing that is worth mentioning is the turning of melons when they are growing. I am convinced it is profitable to turn them over, because where they lie on the ground, if left too long in the same position, they frequently get flat on that side, and if they are turned over and the sun allowed to get on them, it will make a better netted melon with a finer flavour. They should be turned every week until they are ripe. I do not think that would pay if you were growing the small melons, but with the large ones, where you get a good price for them, it is profitable. A melon like the one I have here retails at thirty cents, while you get two



Stone Tomatoes.

dollars or two dollars and twenty cents a dozen for them. I do not know what variety to call it. A man named Giles was the first melon grower around London who introduced that melon. He came to my place a number of years ago, and told me he was going to make a melon grower of me, and gave me some seed, and I grew quite a lot of them. I sold them on the market, and several people got the seed, and I lost it, but got it back again; there are a good many around London. I called it the Giles melon, with salmon flesh. I had one, two years ago, that weighed nineteen pounds. They are nicely netted and well ribbed. We do not shorten the vines out, although I believe it would be profitable in some cases.

A Member.—We practically cover the plants when they are first set out; if you do not, the plant is almost sure to get a check. We have little boxes about two and a half inches square and we set them over the plant and put on a glass, and it gets so hot in there sometimes that you can hardly put your hand in it. We leave these boxes there until the plants nearly fill them, and then we have stakes that we place under the boxes and raise them up, and we leave them in that

way until there is no danger from the cold winds, and even though we may get a frost and the vines outside the boxes may be frozen, those underneath are safe.

THE PRESIDENT.—In melon culture we must have quality. I do not think the growers of Leamington are so much ahead of us in the business that they can ship melons two hundred miles and we cannot compete with them on the market.

The next item on the programme is a report on experimental potato growing at Monteith Experimental Station. Mr. Reeves and I visited that place on the eighteenth or twentieth of August last, to look over the work that was being done with the potato seed that we sent up there, and we spoke to Mr. Whitten with regard to this report. He said that he would be unable to have a complete report at the time of our Convention, as the potatoes would not be ripe enough to dig, and it was decided that Mr. Reeves and I should give the report of the condition in which we found the potatoes, and we shall have full returns later. You all know the reason we had in sending these potatoes to Monteith. There is no question but that in this northern country there are hundreds of miles of land particularly adapted for potato culture. I never saw potatoes make more luxuriant growth in my life than in that country. There are miles and miles of land up there that is particularly adapted for this crop. We used to think when we got to Muskoka we were getting to the limit, and beyond that it was acres of icebergs, and I admit that land in the neighbourhood of Muskoka is rocky and perhaps of no value whatever for agriculture, but when we get past there it becomes alright. I know that every bush farmer always tells you that he has a better field away at the back that you cannot see to-day, but I can say to you that in New Ontario we have the very best farming land.

The first place at which we made any investigation was Englehart. When you get north of Cobalt at Haileybury, you begin to get into some splendid agricultural land. From Haileybury on the crops looked splendid, especially fields of potatoes growing alongside of the track. There are some extensive market gardens around New Liskeard and Haileybury. Everything up there in this line looked all right except onions, which do not ripen well in that district. My opinion is that they do not get sufficient warm weather to ripen them properly. Englehart is only four years old, but in one small potato patch belonging to a German, named Milkie, we saw potatoes planted in rows about three feet apart, and they had to throw the tops from two rows into one to form a kind of windrow. The potato vines were six feet eight inches in length, and we were told that a few days before they had taken up eleven sets of potatoes and had harvested 74¼ pounds. One potato weighed four pounds two ounces. All through that territory potatoes make magnificent growth. They have difficulty in ripening tomatoes. The lowest temperature was, on the 18th of August, 36 degrees, and at Monteith Experimental Station 40 degrees on the same day. That was the lowest for this summer.

Coming to our own seed that we have sent up to be grown for us. This was planted on a piece of uneven soil that I would not select for planting potatoes, but last spring they had only fourteen acres available, and this year they hope to have sixty-five acres. The potatoes looked excellent, with one slight exception. The Early Ohio did not make the same growth and did not look nearly as good as the other varieties. Both the Delaware and Cobbler were excellent. I understand they have difficulty with the Ohio in the Northern districts. I do not know whether another year's experiment will improve them. We hope to carry these experiments out for another year or two. We have a sample of these potatoes sent down by Mr. Whitten. They are not labelled, but I am of the opinion that they

are the Cobbler. We instructed Mr. Whitten to cut the seed to two eyes, and to plant a row of each variety of whole seed, and he found in every instance that the whole seed gave the best results this year, and possibly there is a reason for that. They had a very dry June right after planting, and this land had recently been cleared up and was full of coarse matter, and lay loose and open, and the cut seed would have a greater tendency to dry out than the whole seed.

I want you to notice the texture of the skin of these potatoes. It is, probably, owing largely to the amount of vegetable matter in the soil. They certainly make

A Young Vegetable Grower.

a most excellent appearance. After leaving Monteith station we took a ten-mile walk up the track. Up at Kelso, the camp which is at the head of the trail going into Porcupine, a man has a little place on the side of the track, a clearing of a couple of acres, planted in potatoes and turnips, and they were making fine growth, and we found the same thing all through that territory. There are no potato bugs in that country; they may come, but are not there now, and there is no trace of blight of any kind. The potatoes that we saw were covered with blos-

soms and looked almost like a flower garden, and we saw some growing at mileage 228 which would beat anything we had in Toronto. There is a feature in that, outside of their value to us for seed purposes. I was looking at a report published four years ago by the Department with regard to New Brunswick potatoes being shipped into Ontario, and I find that in 1906 it was estimated that there were between ten and twelve hundred carloads of potatoes shipped into Toronto from New Brunswick, principally the Cobbler and Delaware. The New Brunswick potato growers have taken the cream of the business in this Province. Their potatoes have a good appearance and are uniform in size, and their carloads of Delawares are all of the one kind. We have in our own Province hundreds of miles of territory where we can grow potatoes as good as they can be grown anywhere, and it will be a shorter route from New Ontario than from New Brunswick, and there should be a great future for the grower in Northern Ontario, in supplying potatoes for the cities of this Province. I say this because I think our experiment is proving that our theory was right, and that we have a great country in Northern Ontario for potato growing, and in that Northern country they will make strong growth and large crops, and the Northern-grown potato will be valuable to us for seed purposes.

A Member.—What time do they plant up there?

The President.—That will be shown in our next annual report, but I think about the first week in June.

F. F. Reeves.—I cannot give you any more details of the trip, as the President has covered the ground with one or two exceptions. The instructions we gave Mr. Whitten were that all these potatoes were to be returned to Toronto, and from there distributed to the different branches. I have been thinking that over, and it seems to me we should leave enough potatoes in Monteith to carry on the experiment next year, along with others that we ship from here next year, and in that way we could see if they developed the same characteristics next year that they did this. Possibly the Ohio may be stronger next year. I saw one market garden at New Liskeard, when I was up there judging vegetables and fruit, worked by a man by the name of Brillinger. He has as fine a garden as any man would wish to see, no matter where he goes. Mr. Brillinger grows every variety of vegetable that can be grown anywhere. Onions and tomatoes do not do as well. The growth of vegetables up north is something you would not expect. There is always a tote road beside the track, over which they haul provisions, etc. During the construction of the railway, and wherever this tote road is left along the side of the track, you can see timothy and clover and alsike, and we saw timothy there three and four feet high. We saw barley and oats at the Experimental Station so long that you could not get any reaper in Old Ontario that could cut it, and it was not lodged. The wind was just swaying it backward and forward. I did not see any lodged grain up there, and I think there must be something in the soil that puts vigour and strength into the stock. We saw alsike clover that was sown on oats in June, and was thirty inches high, and we saw one stool of timothy that had one hundred and forty-nine distinct stocks; that was one stool from last year's seed, and a country that can grow straw and corn like that can grow potatoes or anything else, and the future of that country, if it is developed along these lines, seems to me to be assured, and I hope that the experiments that have been started there will be continued. Instead of going to Wisconsin for our supply of potato seed, I feel satisfied we can get it in New Ontario. I would like to suggest that Mr. MacLellan give us a short account of what he has been doing since he has been in Guelph, and what he proposes to do.

NOTES ON VEGETABLES AT EXPERIMENTAL FARM, GUELPH.

A. H. MacLennan.

Since I took control on the 15th of May, this year, I have been carrying on experiments which Mr. McMeans had in hand last year. We have been growing onion seed sent to us from various parts of Ontario. This year we planted one plot of Southport Yellow Globe. The weather conditions this year seemed to be against the onion seed.

I have been working to a slight degree on beets. I took about sixty of the Egyptian and planted them and I do not believe there were two of them alike. You would be surprised at the difference in the maturity of the seed and in the look of the plants that we have got there. There are about 126 plots of vegetables of new varieties that we have grown. The Wealthy tomato and the Earliana have done exceedingly well.

A Member.—Do you find any trouble with the Wealthy?

A. H. MacLennan.—Not so far. Our seeds are selected from two plants in the field from last year. One was chosen for its seed production and the other for its meaty qualities. Our selection work has been along the line of getting as much flesh as we can possibly get for canning purposes, and as smooth with as much flavor as we can get. Our soil is clay loam, and the Wealthy gives us a better flavor than the Earliana, and Number 2 gives us the biggest crop.

Another strain we have is Bonnie Bess. It is a medium sized red tomato.

In corn we have grown almost altogether Golden Bantam. Last year we found several cobs of this variety that were white, which we kept apart, and this year we planted a plot with them and the result has been that we have a crop that is practically the same as Golden Bantam, with not quite the same flavor. I think it will be as good when it is perfected by selection and if we can retain the white cob we shall get rid of the objections to the Golden Bantam. The gardeners say we cannot grow it on account of the cob. I think the White variety will have all the qualities of the Golden Bantam. It has two ears to the stock. In the green house work this summer we had five varieties and about two hundred tomato plants and picked 800 pounds of fruit. The earth in the green house had previously borne a crop of tomatoes, and this was the second crop we had taken without any fertilizer of any description. This year I am going to grow on one side of the green house Kew Clipper, in the centre, Industry, and at the other side, five varieties.

Mr. Wilson said something about shipping tomatoes to the old country. I do not think they could touch our tomatoes in flavor and quality, and they are from four to five to eight to the pound. The Industry is much ahead of the Kew Clipper. In five feet of height we get from four to five trusses of fruit, and I have got as high as nineteen tomatoes from one truss. The Canadian agent for these tomatoes is Cooper, of Grimsby.

Last year we had Grand Rapids lettuce and this year I am growing Boston and New American.

My work for next year will be the handling of cabbage and lettuce, and continuing the work with the tomatoes, and I want to continue the seed work as much as I possibly can, because if we can grow our own seed to advantage, and it has been shown by the work we have done in the onions that we can do so, there is no doubt it will pay us to grow our own seed. I have lettuce, radish, onions, parsnips, cabbage, corn, and beets on hand at the present time.

F. F. Reeves.—A year ago last spring Mr. McMeans supplied me with some Yellow Globe Danvers and I grew a little over a pound of seed, and sent half of it back to the College. I would like to know what was the result of handling that seed alongside of imported.

A. H. MacLennan.—These were all planted after I got there and the onions were still growing when I left. They had been rolled down. The first we planted were seed we got from Bruce, on the 25th of May. We have not harvested the crop yet, but it looks well. I cannot tell the results until we take them off the ground. Three-quarters of the seed onions from the seed we bought are very small. They are just like little sets, and they are ready to pull, but the others are still growing.

Last year we put in an irrigation system, the same as I heard about this afternoon. We had four or five rows of strawberries and nine plots of vegetables under the irrigation system, and we worked these against nine plots without any irrigation. You know how dry it was in June, and the lettuce under the irrigation was three times as heavy by actual weight as it was on the other side where we did not use it, and it was ready over a week before the other was. In fact, the other was really never fit to use. It burned so badly, while the lettuce that was under irrigation could be held for two weeks after it was ready to use. If we had the time and the men to do it, we would extend the irrigation on to the celery. It kept the lettuce from going to seed.

W. J. Kerr.—Just about the time that our vegetables are ready to be marketed large quantities are imported by the Jews and Italians of Ottawa and sold to the street vendors—who are all Jews—at a very low price. Householders do not reap any benefit, because they retail them at the same price as our local products. They go from door to door with stuff and the householder buys it. This is the clean-up of American gardens. The American grower has a large acreage of cabbage and he cuts out of that until the best of it is gone, and being far enough south so that he can grow another crop he wants the ground cleaned up, and he sells the remnant for a nominal price and the purchaser goes in there and cuts out everything he can market and ships it to Canada invoiced at practically a nominal price and pays a very low duty. We can buy it much cheaper than we can grow the stuff. The duty at the present time is regulated by the value of the produce. We have been trying to see if we could not get a change made in the method of collecting this duty and have it on an Ad Valorem basis so that they will pay so much per dozen on cabbage. If we could do that we could get back at these fellows and keep this stuff out. We tried to get the Government to apply the dumping clause against this stuff, but we were not strong enough. Ontario alone was represented and nothing came of it.

A Member.—Unless fruit growers, vegetable growers, and honey men wake, we are going to lose a big market in the North-west. A deputation recently asked the Government to take off the duty during certain portions of the year. We must look after that.

We find that our fruit is tampered with by the express agents and often times is not accepted by the men to whom it is shipped, and we should do something to stop that pilfering.

W. J. Kerr.—When we get a consignment of fruit from Western Ontario with nearly every basket opened it means that the profit is gone off that, and we do not like to handle it and it is refused, largely as a lesson to the Express Companies; they are liable for it and the shipper should get redress from them.

A MEMBER.—I live in Sarnia, and have often noticed that it is not the express agent who is to blame. The fruit is transshipped from railway to boat and I have noticed the men who are working around the docks take out their knives, and pull out the fastener and put their hands in the basket and take out some fruit. There is a great deal of that being done and you cannot blame the express men for that, because they cannot watch everything.

THE PRESIDENT..—We are ready to back up any shipper that goes after the express men if they pilfer his products.

Moved by W. J. Robb, seconded by W. J. Kerr, "This Association places itself on record as being opposed to any reduction whatever in the customs tariff on fruit or vegetables." Motion carried.

ADDRESS OF WELCOME.

MAYOR J. H. A. BEATTIE, LONDON.

I am exceedingly glad to have you here because I realize that you represent a very important industry; in fact, it is becoming more important every day, and when we consider the price to which beef is soaring, I think we shall all have to become vegetarians. Most of us can remember the time when the farmers of Ontario went in extensively for raising wheat. But now that the North-West has opened up they do not grow it to the same extent, and, consequently, they have to go into other lines and hence the industry which you are promoting becomes more important. I do a little vegetable growing on my own account in my garden, but I am not an expert and will not attempt to go into particulars.

I understand from looking at your programme that there are some gentlemen here from the other side of the line to address you and I extend to them, too, a very hearty welcome and I am glad to know that they are here prepared to take part in your deliberations and that to me is one more evidence of the friendship that exists between the two nations on this continent, and I trust it always will exist between Canada and the United States.

I trust that your visit has been a pleasant one and that the rest of it will be enjoyable and that you will make yourselves at home while here and we hope that your stay with us will be so pleasant that you will be glad to come back. I understand this is your first convention outside of Toronto, and I hope it will not be the last convention you will hold in this City. If you cannot come next year we hope you will be able to come the year after.

I hope that when you go away you will carry with you pleasant recollections of our City and I trust that your deliberations will be of use to you and that your convention will be a great success.

THE PRESIDENT.—We are very pleased indeed to have had Mayor Beattie with us and to have had this address from him. Speaking on behalf of the Association, I am sure we appreciate the kindness that has been extended to us by the City in giving up this Hall for our meeting place.

INSECTS THAT ATTACK VEGETABLES.

L. Caesar, O. A. C., Guelph.

As there are more than 100 insects that from time to time are found doing considerable damage to vegetables, it is impossible to discuss these all in one paper. I shall, therefore, devote my attention only to a few of the most troublesome, viz.: Cutworms, Flea-beetles, Asparagus Beetles, the Striped Cucumber Beetle, Root Maggots, Cabbage Worm, Wireworms, and Aphids. A good account of most of these and of many other insects is to be found in "Insects Injurious to Vegetables" published by Orange Judd Co., New York, and costing $1.50. Every vegetable grower should have this book, and also Bulletin No. 52 from the Department of Agriculture, Ottawa, and Bulletin No. 171 from the Department of Agriculture, Toronto. The latter bulletin contains also an up-to-date account of the diseases of vegetables with means of prevention.

There are certain farm practices that are employed by many but not by all vegetable growers, and that are important in keeping not only insects but what is also equally as important, plant diseases, in check.

(1) *The destruction of all remnants of crops and all rubbish,* so far as possible, *each fall.* This should be done by gathering and burning, and not by ploughing down, as the latter method would not destroy fungus or other diseases. By burning the vines, leaves and other remnants of plants, we not only destroy any insects, like borers and miners, that may be concealed inside the leaves, stems or roots, and the eggs that are laid by plant lice and other insects on the plants, but we also remove the natural hiding places for large numbers. Keeping fence corners mowed and clean, and having as little brush as possible on or around the field or garden will also assist in the same way.

(2) *Fall ploughing.*—The turning over of the soil in autumn buries deeply numerous insects that pass the winter in the egg or pupal stage on or near the surface of the ground. Many of these will be unable to escape. Again other insects, such as wireworms and white grubs, are by this means turned up to the sun, rain and frost, and these along with the stirring of the soil destroy countless numbers. Furthermore, thorough working of the ground in spring supplements this fall ploughing and destroys its quota.

(3) *Rotation of crops.*—It is but natural that most species of insects should pass the winter at or near the place where they found abundance of food the previous year, and that they should search for it in the same place the next season. Some insects, in fact, are without wings and can only move from place to place slowly. Keeping these things in mind, it follows that we should not plant the same kind of crop, or another crop that is attacked by the same kind of insects, two years in succession in the same place, but should replace it by a crop of a totally different kind. This is also better for the soil and so for the crop itself, quite apart from insects and plant diseases; because one kind of plant takes one substance out of the soil, while another takes another; again one crop is a deep feeder, sending its roots far down, while another feeds near the surface; so that by rotating crops we do much to prevent the rapid exhaustion of the food supply. There may, of course, be an occasional exception to this rule, but such exceptions are very rare.

(4) *Good cultivation and fertilization of the soil.*—The richer the soil is kept and the better cultivated to preserve moisture, the more thrifty the plants will be and the better able to withstand insect attacks.

So much then for farm practices as a means of controlling insects. Now let us come more directly to the insects themselves. Just as with anything else, the more we know about insects, the more intelligently and economically we shall be able to deal with them. From this standpoint the teaching of Nature Study in our high and public schools should give the rising generation an advantage over the present. There are, however, a few very important points about insects that we can all readily learn. The first and most important of these is that insects are divided into two great classes, biting insects and sucking insects. The easiest and simplest way for most people to determine to which class any species belongs is to observe whether in feeding the insect removes the tissues leaving holes or ragged edges. If so, it is a biting insect. If on the other hand none of the tissues are removed and the feeding causes the leaves or plants to become sickly, the insect is a sucking one. It stands to reason that if the part of the plant that a biting insect feeds on is covered with a deadly poison, like arsenate of lead or paris green, the insect will devour this and be killed. On the contrary, sucking insects cannot be killed by any poison of this kind, because they insert their sharp beaks through the skin of the plant and suck the juice from within, thus never having any chance to absorb the poison. Sucking insects accordingly must be destroyed by being actually hit by some substance that will kill them by coming in contact with their body. The best-known of such substances in the case of insects attacking vegetables are kerosene emulsion, whale oil soap, tobacco decoctions, pyrethrum powder and common soap suds. To get good results with these mixtures on some kinds of insects it is necessary to apply them with considerable force, while the insects are still young and their bodies soft and unprotected by wings or wing covers.

The second important point to know about insects is that during the course of their life history they pass through several quite different stages. In most cases there is the egg, which hatches into the tiny grub or caterpillar or maggot. When this is full grown it in turn changes into the pupa, usually a smooth brownish cigar-shaped creature; and after a time from this there comes forth the winged adult which will lay eggs and thus start the same round again. Of all these stages, as a rule, it is only in the second or caterpillar stage that any injury is done. Hence when we see a large green tomato worm disappear, or a horde of Cutworms suddenly vanish, we may expect that they have merely entered the ground to pupate and that there will be no more damage from them that season. A number of biting insects, like grasshoppers, and many sucking insects, such as leaf-hoppers and leaf bugs, pass through only three stages: The egg, nymph and adult; the nymph differing from the adult chiefly by its smaller size and the absence of wings. Such insects feed in both the later stages.

With these remarks which, though commonplace to many, may yet be new to a number, and therefore useful to them, we shall pass to a consideration of the very destructive insects mentioned in the introductory paragraph.

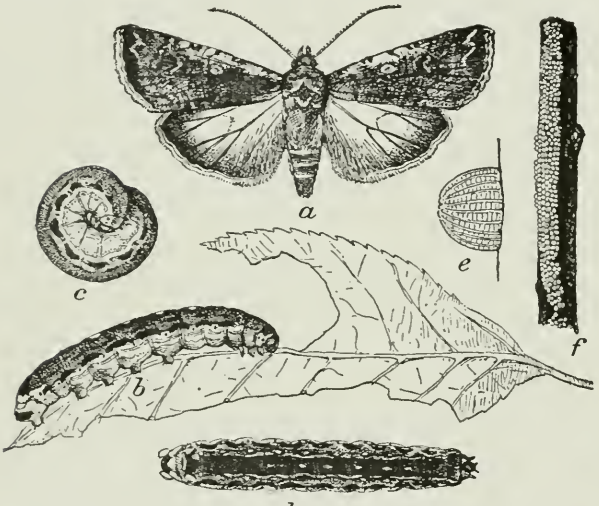
Cutworms.

Every vegetable grower knows to his sorrow the stout, smooth, dull-coloured caterpillars that at night cut off his plants at the roots, or climb up them and destroy the buds or other parts.. In the daytime they conceal themselves in the earth at the base of the plant or lie curled up under a board, or any protection near by. There are many kinds of Cutworms; some do most damage to plants soon after they are set out in spring, others not until June or July, and a few in

August, or even September. The adults of Cutworms are moths—those dull, brown moths with about one inch of expanse of wings that fly around at night and come into the houses to the lights. Most of the moths we see are Cutworm moths. These lay their eggs, as a rule, where they think there will be plenty of food for their young when they hatch. Hence the part of our fields where weeds are allowed to grow wild is the place where the Cutworms are most likely to trouble us the next year. The eggs are in most cases, but not in all, laid in the fall, and the young caterpillars which hatch from them feed for a while before winter and then remain hidden in the soil till next spring. As soon as vegetation begins they greedily search for food, and, being already a considerable size, are very destructive.

Means of Control.

From what has been said above about the place of egg laying, we should try to keep our fields as free of weeds as possible throughout the season, so that the



Variegated Cutworm—*a*, moth; *b*, *c*, *d*, caterpillars; *e*, egg (magnified); *f*, eggs on a stem.

Cutworm and Moth.

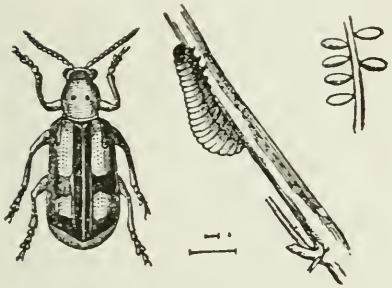
The Glassy Cutworm.

moths will tend to go elsewhere to lay eggs. The destruction of rubbish as early as possible in the autumn, followed by ploughing, will help to destroy many of the eggs or young caterpillars. When the Cutworms are present in the soil and causing destruction to plants, they can in almost every case be held in check by the use of poisoned bran. I have myself used this on different occasions with excellent results, and I have no doubt some of you have had similar good results with it. It is being used all over North America to-day as the standard remedy for Cutworms of all kinds. The formula is: 50 lbs. bran, 1 lb. paris green, 1 patent pail of water sweetened with a few pounds of sugar or a little molasses. Put the bran into a box of the necessary size, moisten it with the sweetened water until it is just wet enough to fall through the fingers easily without being sticky, then dust some of the Paris green over it and mix well; repeat until all the Paris green is thoroughly mixed in and can be seen on every particle of the bran. This can then be carried out to the field and applied about sundown, so as to be fresh and attractive when the caterpillars begin to feed. I apply it by taking a

pailful on one arm and then walking down the row and dropping about a spoonful with my hand by the base of each plant. The Cutworms evidently prefer this substance to the plants themselves, and thus are readily poisoned. If one suspects in spring that his plants will be attacked by Cutworms he should scatter a little of the poisoned bran over the ground an evening or two before planting.

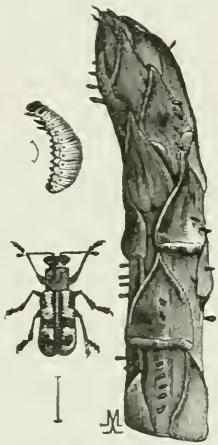
Flea-Beetles.

These are tiny little beetles, usually not more than 1/10 of an inch long. Most of them are black, but some are a dusky green, and others are marked with yellow, red and other colors. They get their name from their habit of leaping away like fleas when disturbed. Probably the most troublesome of all is the striped Turnip Flea-beetle (*Phyllotreta vittata*). This insect is black, with a wavy band of pale yellow running down each wing-cover. It attacks almost all kinds of plants belonging to the order Cruciferae, such as turnips, radishes, cab-



Blue Asparagus Beetle, larva and eggs—magnified.

Twelve-spotted Asparagus Beetle—magnified.



Blue Asparagus Beetle, larva and eggs on shoot.

bage and cauliflower, and I have seen it this year very abundant on some kinds of wild mustard. The Potato Flea-beetle (*Epitrix cucumeris*) is another troublesome flea-beetle. It attacks potatoes, tomatoes and sometimes cucumbers. The insect is very small and black and eats tiny holes in the leaves, sometimes affecting them so severely that they die. Blight gets a chance to enter through the injured parts. There are several other kinds besides those mentioned that attack various kinds of vegetables. Most of the damage from flea-beetles is done early in the spring just after the plants have been set out, or the seedlings have appeared above the ground. In such cases it requires very prompt measures to prevent the destruction of the whole crop if the beetles are numerous.

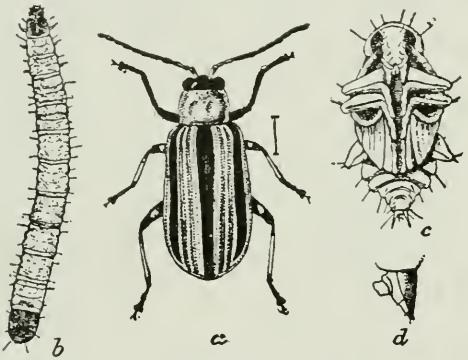
Remedies.

(1) Late planting. From what has been said above one might hope that the beetles would soon slacken off, lay their eggs and either disappear or not attack so voraciously plants that were sown late in the spring. This is usually the case, and in most seasons turnips can be sown with comparative safety after June 20th as can also many other plants.

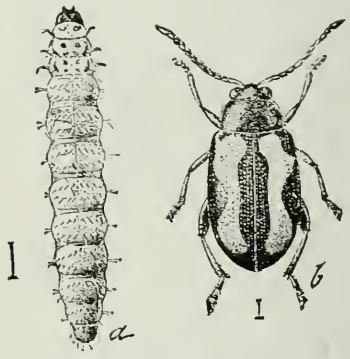
(2) Poisoned Bordeaux mixture. In many cases the beetles can either be destroyed or driven away by spraying the plants as soon as they appear with Bordeaux mixture, to every barrel of which three or four pounds of arsenate of lead has been added. This will have to be repeated about every third day until the plants get once well started, when it can be discontinued. On account of the smooth surface of cabbage and some other plants, it is well to add a sticker to the Bordeaux. This is made as follows: Boil together 2 lbs. resin and 1 lb. sal. soda in 1 gallon of water in an iron pot in the open until a clear brown liquid is formed. This will usually take from one to one and a half hours. Add the above amount to every forty gallon barrel of the poisoned Bordeaux. Many other remedies have been advocated for the destruction of Flea-beetles, but poisoned Bordeaux has given the most satisfactory results.

Asparagus Beetles.

The common or bluish Asparagus Beetle (*Crioceris asparagi*) and the Twelve-spotted Red one (*Crioceris 12-punctata*), though comparatively new pests have already spread over most of the province and are causing much loss to asparagus



Striped Cucumber Beetle, grub and pupa—much enlarged.



The Turnip Flea-beetle and larva—greatly enlarged.

growers. The plants are attacked throughout the whole season, and not only the larvæ or slugs, but also the adults feed greedily upon them. The two species differ somewhat in their habits, but as the remedy for both is the same, we shall not go into details in regard to the difference.

Means of Control.

(1) *Spraying.* The best way to keep this pest in check is to spray the plants carefully from both sides after the cutting season is over with three pounds arsenate of lead to every forty gallons of water. The sticker mentioned above under Flea-beetles should be added, and also two or three pounds of freshly slacked lime: the lime being added solely to insure that any excess of sal soda may not act upon the arsenate of lead and cause it to burn the foliage. As this spray does not kill the eggs it will have to be repeated two or three times at intervals of a week or ten days until the plantation is entirely free of the pest. By this method of destroying the insects the plants get a chance to grow thrifty and store up plenty of food in the roots for the following spring and fewer beetles will attack

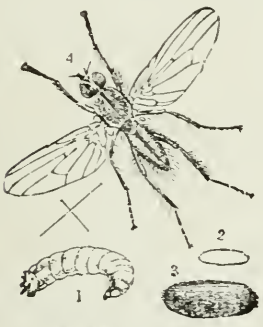
them during the cutting season. Of course the poison cannot be sprayed on plants that are being cut, but new plantations which are not cut the first year should be sprayed quite early to protect them.

(2) *Chickens and Ducks.*—Where these are allowed to run on the plantation during the cutting season they seldom do any injury to the plants and are very helpful as destroyers of the beetles.

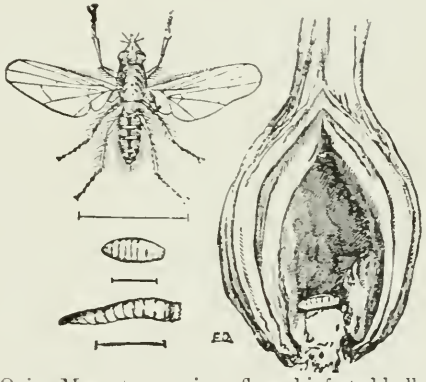
(3) Frequent cutting gives the eggs in the early season no chance to hatch.

Striped Cucumber Beetles (*Diabrotica Vittata*).

Every grower of cucumbers, squashes, pumpkins or melons is familiar with the small beetles, about one-fourth of an inch long, with alternate yellow and black longitudinal stripes on their wing covers. They are often very destructive, and are certainly very difficult to combat successfully. The chief damage is done in spring to the young plants just after they appear and when they are least able to withstand an attack. At this season the adult beetles, which winter in the ground or under any good protection, are very hungry and during one or two



Cabbage Maggot, puparium and fly—enlarged.


Onion Maggot, puparium, fly and infested bulb.

weeks feed very voraciously. At the end of that time mating begins and they become less destructive and more particular about what they eat, often refusing to touch plants with foreign substances on them. The yellow eggs are laid in the soil near or around the roots, and if the earth is damp the young larvae feed on the roots, vines or fruit that may happen to be near them. The new adults that appear later in the season also feed ravenously upon the vines and the fruit.

Means of Control.

(1) *Trap Crops and Spraying.*—It has been found that the beetles prefer squashes to other kinds of cucurbits, hence before sowing the cucumbers or the regular crop a considerable number of squashes should be sown around the outside of the plantation to attract the beetles. As soon as they appear they should be heavily sprayed every few days with arsenate of lead, 3 or 4 lbs. to 40 gallons of water. When the cucumbers or regular crop comes up spray it with Bordeaux mixture and arsenate of lead of the above strength, repeating the spray several times until after the vines have begun to run. The Bordeaux is added chiefly as a repellent, since the beetles after the first week or so usually refuse to eat plants covered with it. Bordeaux also helps to keep off the mildew and gives vigour to

the plants. Later in the year squashes should be planted and left to attract the greedy new adults. These can then also be sprayed with the arsenate of lead and many of the beetles will be destroyed.

(2) *Burning Refuse in Autumn.*—Advantage should be taken of the habit of the beetles late in the fall to congregate in great numbers on old cucurbit fruits and vines, especially where these are gathered into heaps. I have seen the beetles in thousands in such places on frosty mornings. If then the refuse be gathered into heaps after the picking season on some frosty morning and a covering of straw is thrown over them and set on fire, countless numbers of the beetles would be destroyed and the number left for the next season thus greatly lessened.

(3) *Coverings.*—A very satisfactory method of protecting young plants in the spring on a small scale is to cover them. For this purpose cut a barrel hoop in two, so as to form two semi-circles. Then place one of these over the other and at right angles to it, and insert the ends of both in the ground. Two bent wires will, of course, do instead of the hoops. The frame thus made should be covered over with gauze or some such material and a little earth thrown up around the edge, so that no beetles can get under. It must be put on the plants before the beetles get any chance to attack them and can be left on until the plants are too large for such limited space. This affords a complete protection, but is hardly practicable on a very extensive scale.

Root-Maggots (*Pegomyia Sp.*).

Root-maggots are almost a cause of despair to vegetable growers and to entomologists. About one hundred different kinds of remedies have been carefully tried against them and only a very few of these found valuable, in fact I know of no really satisfactory and economical remedy for these insects. There are three different kinds of root-maggots, though they all look very much alike. The first, *Pegomyia brassicae,* attacks cabbage, cauliflower, turnips, radishes, and certain closely allied wild plants, like hedge mustard and cress. The second, *Pegomyia cepetorum,* attacks onions, and the third, *Pegomyia fusciceps,* attacks chiefly the roots of corn and beans. This last species is seldom very troublesome, so we shall not discuss it.

The adults of the root-maggots are flies very like house flies. The life-history is briefly as follows: The flies emerge from the soil in spring, lay their little, white, elongated eggs on the ground around the base of the plants, or sometimes on the stem itself. In four or five days the eggs hatch and the tiny white maggots at once attack the neighboring roots. When full grown, the maggots cease to feed and change to a brownish pupal condition in the soil close by where they fed. After a few days adults, two-winged flies, emerge from these cases, and lay eggs for a second brood. These adult flies resemble the house fly, but are smaller and more slender. In some cases there seems to be a third brood. The winter is spent by the Cabbage Root-maggot in the pupal stage in the soil, and by the Onion Root-maggot in the adult stage. The species that attacks the cabbage and closely allied plants seldom does much damage after the end of June, whereas the Onion Root-maggot continues to be destructive all the season.

Means of Control.

(1) Destruction of weeds like mustard, cress and shepherd's purse, which belong to the same family as the cabbage and radish, and some of which are host plants for the insects.

(2) Use of carbolic emulsion or of white hellebore.

The carbolic emulsion is made as follows: Boil 1 quart of soft soap or 1 lb. hard soap in 1 gal. water. When boiling, add ½ pt. of crude carbolic acid. Boil for a few minutes longer and stir thoroughly until well emulsified. The emulsion can then be stored away and will keep for several days. When used it should be diluted by adding fifty gallons of water to each gallon of the emulsion, and sprayed directly upon the growing plants and around the roots once every week from the time they appear above the ground or the cabbages are set out until about the end of June. Onions may require later treatment.

The hellebore decoction is made and applied as follows: Steep 2 ozs. of good, fresh, white hellebore in 1 qt. of water for 1 hour, then dilute with water to make 1 gal. of the decoction. Apply with a watering can, with the rose or knob removed, a few days after the plants are set out; 5 days later apply again and again in 5 days after this, and a couple of times afterwards at an interval of a week, until the plants have got thoroughly established. About 1 teacupful should be poured around the base of each cabbage plant. In clay soil especially it may be necessary to remove a little earth first from around the stem to prevent the liquid running off.

Note.—Each of these remedies has given good results, but only when thoroughly done. Great care must be taken to do them early enough to prevent the maggots from getting a good start, for if this once happens no known remedy can be relied on to destroy them. The hellebore decoction is gaining in popularity of late years compared with the other, and I have met several men who have had good results from it. Either of these remedies can be used for onions as well as for cabbages or radishes.

(3) *Tarred Felt-paper Discs.*—Prof. Slingerland, one of the most careful investigators in North America, found that by placing tarred felt-paper discs around his plants on the same day as they were set out, cabbages and cauliflowers could be almost entirely protected from the root-maggot. Many have since this discovery used them with entire success, while with almost as many more they have been a failure. Probably in most of the latter cases we can find a reason for the failure by noting the following points:

(*a*) The material used for making the discs should not be tar-paper but tarred felt-paper. The former curls up with the heat and light and allows the flies to get underneath and lay their eggs close to the plant, whereas the other remains flat.

(*b*) The felt-paper should be pliable and soft and of only one ply, so that it will fit so closely around the stem that neither fly nor maggot can work its way down.

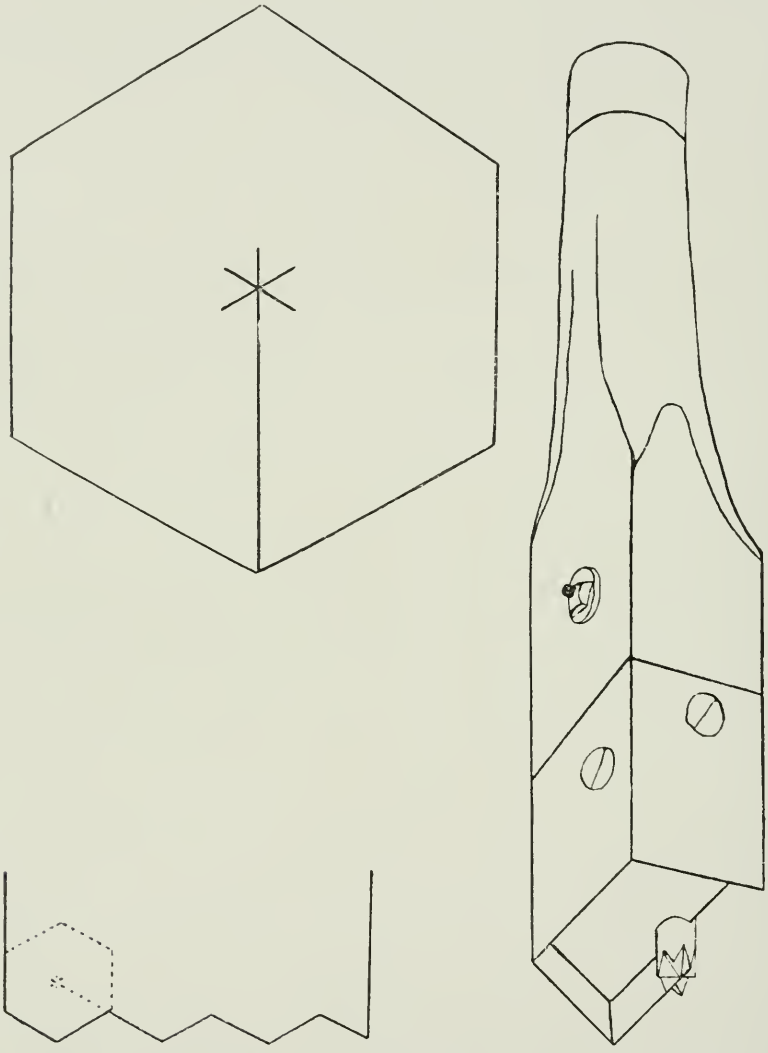
(*c*) The ground should first be flattened or smoothed with the hand, so that the disc will sit close on the ground and no flies get underneath to lay eggs. They should not, however, be pressed so low that earth will get on top of them and keep the part around the stem moist.

(*d*) The discs must be put on the same day the plants are set out: in fact, the man with the discs should follow the planters. If there is a delay of several hours the flies, if abundant, may in the meantime have laid many eggs and consequently the discs cannot save the plants from the maggots that hatch from these.

The following figure shows the shape of the discs used and the instrument employed in making them.

The discs themselves are 2½ inches in diameter. The blade of the cutting tool is made of a band of steel bent into the form of a half hexagon, and then

taking an acute angle reaches nearly to the centre, where there is a separate structure for making the star-shaped cut. The blade can be sharpened; the handle is of wood. Many persons make the discs with a knife and wide chisel in the winter and store them till required, but the tool is a quicker method, and if correctly made there is no waste of the tarred felt-paper. With it one man can cut

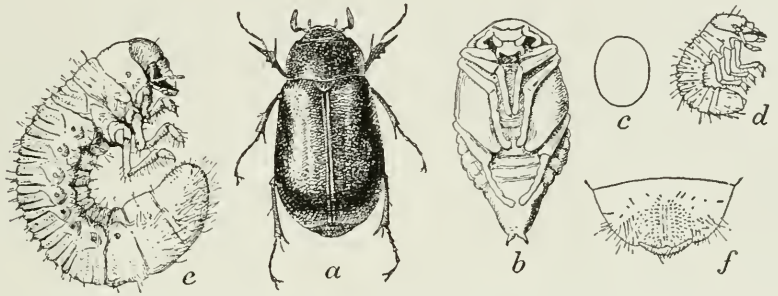


Tarred paper card and method of cutting. Upper figure, outline of tarred paper card, natural size. Figure on right, tool for cutting the cards, about half size. Lower figure on left, diagram showing how the tool is used. The dotted line indicates the position of the edge of the tool.

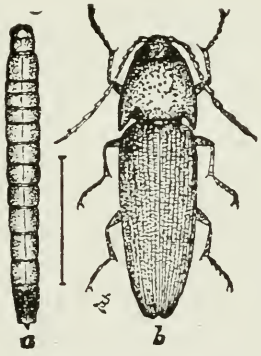
about 5,000 discs a day. Moreover, they can be placed on plants very rapidly, one person being able to put on from 200 to 400 per hour, so that the time and labour required are not so great as one would think.

(4) *Apterite.*—This is a strong smelling, purplish, dry substance, sold by William Cooper and Nephews, Toronto. Last year I tried it without any apparent

success, but as my method of doing so seemed to me to be faulty, and as it was not applied quite early enough, I decided to test it again this year. The foreman of the vegetable garden at Guelph distributed the amount stated on the directions in drills where the cabbages were to be planted three days later. This was then covered over, and at the expiration of the time the cabbage were set out. Unfortunately, the foreman forgot to leave a check drill as he had been requested.



White-grubs: *a*, beetle; *b*, pupa; *c*, egg; *d*, young grub; *e*, mature grub. (*Chittenden, U.S. Dept. Agric.*)



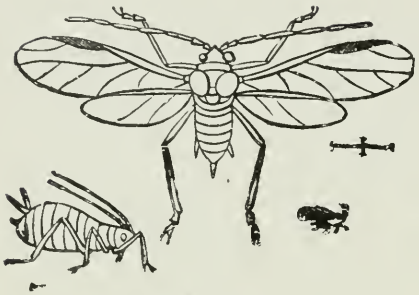
a, Wire-worm; *b*, Click-beetle.

Almost every plant thus treated grew, so that to all appearances the substance was a success, because the rows were near where badly infested cabbage had been grown last year, and cabbage in an adjoining field this year set out within a day or two of the same date were severely attacked and a large proportion killed. Nevertheless, the absence of a direct check prevents my feeling justified in recommending apterite, though I think it should be tested on a limited scale until we are certain what merit it possesses.

(5) *Coverings.*—Radishes when grown in small quantities can easily be kept free from root-maggots by sowing them on fresh land where no pupa would be expected to be wintering, and covering them with cheesecloth tacked to boards, and supported by a wire or two in the centre to prevent sagging. Of course, there must be no holes. I used this method myself this year, and had no maggots in the covered radishes, while those not covered were attacked.

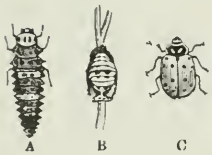
The Cabbage Worm (*Pontia Rapae*).

This troublesome, soft, velvety, green worm is, as almost everybody knows, the caterpillar of the White Cabbage Butterfly. Some seasons cabbage and cauliflower are badly injured by its attacks.



Winged aphis and wingless form—much magnified.

Wingless aphis—greatly enlarged.



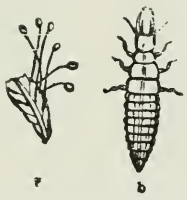
A B C

Lady-bird beetle — *a.* larva; *b.* pupa; *c.* beetle—natural size.

Lady-bird beetle and larva—magnified.

Lady-bird beetle —slightly enlarged.

Lace-winged fly.



Lace-winged fly—*a.* eggs on stems; *b.* larva.

Syrphus-fly larva sucking an aphid

These show some of our insect friends; they all feed upon aphids.

Means of Control.

Before the cabbage begin to head or the flower to form on the cauliflower dust the plants thoroughly when the dew is on with paris green and flour, in the proportions of 1 lb. paris green to 50 lbs. of flour. Repeat if necessary. Arsenate of lead, 3 lbs. to 40 gals. of water with a sticker (see under Flea-beetles), and 2 or 3 lbs. of freshly slaked lime, could be sprayed over the plants, instead of the dusting with paris green and flour. After the heads have begun to form there is some danger in using the paris green, so in its place good, fresh pyrethrum powder of the strength of 1 oz. in about 2 gallons of water may be sprayed over the plants. This gave me excellent results, killing every worm it touched and also the chrysalids.

Wireworms.

As a rule wireworms are not very troublesome in vegetable gardens, because such gardens are usually kept free from grass and are ploughed in the fall of the year, fall ploughing and clean cultivation being the best known means of ridding a field of these insects and of white grubs. I have, however, mentioned wireworms here because I want to call the attention of vegetable growers and others to a method used by Prof. Fernald in the United States with much success to prevent wireworms from destroying seed corn after it is sown. Prof. Fernald puts tar on the seed in the manner practiced to keep off crows; then to dry it so it will go through the seeder he places it in a large bucket containing fine dust and paris green, mixed in such proportions that the corn, after being shaken up in the bucket, shows a greenish colour. The corn, in his two years' experiments, never failed to germinate, and was quite uninjured by the wireworms, which were probably repelled by the covering substance rather than killed by it. A few persons, however, claim that the corn they treat does not germinate well. So that while the remedy should be tested as a very promising one, it should not be used on all seed the first year, but only on a small part of it.

Aphids.

The last few years aphids have been very destructive, especially to cabbages and turnips. Their abundance during these years is due to the failure of their natural foes, the ladybird beetles, syrphus fly larvae, aphis lions, hymenopterous parasites and fungus diseases to overtake them. That they will overtake them before long and reduce them to such an extent that they will not trouble us much for a considerable time is certain. In the meantime it is difficult to recommend any really satisfactory means of control. The best method I know of is to go over the field from time to time, watching for the first sign of infested plants, and as soon as any are seen spray them thoroughly and forcibly with kerosene emulsion, so that not an aphid may escape destruction. A gentle mist spray falling on them will not reach their bodies, because of the bluish-white, waxy covering; hence, they must be hit forcibly with the spray. When the whole field gets once severely attacked, I have never been able to get successful results from any spraying.

While many of the means of control mentioned in connection with the insects dealt with are fairly satisfactory, I hope and believe that in a few years much more successful remedies will be discovered and vegetable growing made more easy and profitable in consequence.

A Member.—Have you had any experience with club root?

L. Caesar.—No, I know no remedy for it. You should destroy any plants that you see with the club root. It is not safe to feed them to stock, because in passing through the stomach they are not destroyed, and the manure will spread the disease. Next year plant on a different soil. If you have to use the same soil, lime it over the preceding fall with about 80 bushels of fresh lime to the acre.

A Member.—Do you think it possible for the club root to grow in the seed?

L. Caesar.—No, it grows in the soil. If you think there is any danger from the seed, take one gallon of formalin and five gallons of water and dip your seed in that, and then take it out and let it dry. Mustard will sometimes get the club root and also cress and false flax.

EXPERIMENTS WITH CABBAGE, TOMATOES AND ASPARAGUS.

Prof. Myers, State College, Pennsylvania.

The Department of Horticulture of the Pennsylvania State College and Experiment Station is making an exhaustive study of the three leading truck crops, viz., cabbage, tomatoes and asparagus. Nearly six acres of ground are devoted to this work, which includes seed selection, methods of culture, fertilization, variety and strain tests. Of these, the strain tests are considered the most important.

The present chief of the Department of Horticulture, Prof. R. L. Watts, was a commercial vegetable gardener several years previous to the time he accepted the position at State College. In the course of his experience he observed that seed of the same variety, when secured from different seedsmen, frequently gave

Strains of Jersey Wakefield Cabbage.
Nos. 1, 2, 3 and Check.

different results. On accepting the position at State College, he outlined extensive experiments to determine to what extent this is the case, and the relation of these variations to profitable crop production.

In the spring of 1908 seed of Jersey Wakefield and Danish Ballhead cabbage was secured from twenty-five seedsmen located at various places throughout the United States and Canada, and of twelve strains of tomatoes, including the varieties Earliana, Chalk's Jewel and Matchless. Last year a new lot of seed of eight varieties of cabbage, including the varieties Jersey Wakefield, Charleston Wakefield, Early Spring, Early Summer, Succession, Premium Flat Dutch, Surehead and Volga, and six varieties of tomatoes, including Earliana, Chalk's Jewel, Beauty, Globe, Matchless and Stone, were secured from fourteen to twenty-nine different seedsmen, and are now being tested along with the seed secured the previous year.

At the outset, permit me to say that, in general, I believe seedsmen and seed growers to be a reliable class of business men, and in the most of the instances they have shown an appreciative interest in the work we are doing. I feel sure that in the majority of cases they are using their best efforts to supply their customers with goods that will be satisfactory. Apparently a few are indifferent, while for unknown reasons some of the seed secured from other seedsmen, who appear to exercise great care, does not produce satisfactory results. Why this is the case we are unable to definitely explain, but it is with the hope of solving the problem, in an endeavour to secure seed which will yield the most satisfactory returns, that the Pennsylvania Station is studying the problem in the manner indicated.

Strains of Jersey Wakefield Cabbage.
Nos. 4, 5, 6 and Check.

The farmer who uses only one strain of seed for his plantings may be unaware of the fact that there is a difference between strains. If he has been fortunate in securing a good strain, and growing conditions are satisfactory, he may secure a good crop. On the other hand, the crop may be a partial or a complete failure, and he may ascribe the cause to unfavourable soil or climatic conditions, insects or disease, and overlook the fact that the trouble may be with the seed.

Ordinarily we are too ready to accept seed for what it appears to be, not for what it may be, forgetting the fact that Dr. Tracy has well stated that "the seed is the future plant packed for transportation." We do not realize that upon it fully 90% of our success in securing a satisfactory crop depends.

Some time previous to the planting of the seed a germination test is made. This is important from the fact that it serves as a guide to the thickness of sowing. The test is comparatively simple, and may be made in several ways. One

way is to place the seed between pieces of blotting paper kept moist on a saucer nearly filled with moist sand, an inverted saucer serving as a cover to prevent evaporation. Or the test may be made under normal conditions in the seed bed. Either of these methods are satisfactory. In tests which we have made we have found the germination range from 0 to 99% within the same variety purchased the same year. If the percentage does not fall below 60 or 75%, the result is not so serious, so long as the facts are known, but if it falls below this, and the fact is not known, disappointment may be the result.

In conducting the experimental work every effort is made to have conditions as uniform as possible. The seed of the early cabbage and tomatoes is sown in flats in the greenhouse, and later the plants are transplanted and placed in the cold frames, where they are grown and hardened until ready for the field.

Strains of Early Spring Cabbage.
Nos. 1, 2, 3 and check.

Soon after the seeds have germinated notable differences may be seen between the strains. In some instances the stand will be even and vigorous, while in other cases it will be uneven and weak. An interesting feature noted is that in several instances those strains which made the best appearance in the seed bed later proved to be the least desirable.

When the field planting is made of the Wakefield varieties one hundred of the best plants are taken of each strain and planted in rows which are a uniform distance apart, and at a uniform distance in the row. For the test of each of the other varieties fifty of the best plants of each strain are used. The plantings are made on fertile ground and are given good care throughout the season.

The most interesting differences are not noticeable until the plants are nearly mature. As the season advances the plants of one strain will be notably uniform, while probably those of the adjoining row are decidedly irregular in type and time of maturing, and in some instances prove to be a variety other than what is

expected, or possibly a mixture of several varieties. At this time the plants of each strain are carefully studied and the important points concerning each strain are noted and placed on record. When the strains are ready to harvest a record is kept of the number and weight of heads at each cutting. In this way we secure definite knowledge of the relative earliness and yield of each strain.

The following table shows the relative yield as well as the yield of the first cutting of twenty-nine strains of Jersey Wakefield during the past season.

Record No.	First Cutting		Total Yield per Acre	Record No.	First Cutting		Total Yield per Acre
	Heads	Weight			Heads	Weight	
		Lbs.	Tons			Lbs.	Tons
Check	16	32.8	11.1	15	26	43.8	10.7
1	16	25.8	11.0	16	16	26.0	13.1
2	8	12.8	9.0	17	36	65.8	13.0
3	5	7.3	10.3	18	.....	.....	9.5
4	7	11.0	9.0	Check	31	47.5	.....
5	6	11.0	11.5	19	19	36.0	12.9
6	5	6.0	8.2	20	15	23.5	12.3
Check	20	31.8	.....	21	16	27.8	11.5
7	21	29.3	9.0	22	16	28.8	11.4
8	25	41.8	10.4	23	9	15.8	11.0
9	20	27.0	9.1	24	8	11.8	11.9
10	5	8.8	8.9	Check	20	33.0	11.1
11	15	21.5	11.2	25	6	8.5	10.4
12	12	20.0	9.5	26	7	9.0	13.7
Check	16	24.5	.....	27	8	12.5	10.6
13	19	27.5	10.9	28	.....	.....	10.8
14	11	16.0	8.1	29	6	11.0	9.6

The first cutting was made July 7, just twelve weeks from the date of field planting. From the table we see that the number of heads cut from the various strains varies from none to thirty-six, while the weight varies from nothing to sixty-five pounds. Usually it is at this time in the season that prices are highest, and thus the desirability of having a strain which will mature early and evenly. Comparing the total yield per acre, of the given strains, we see that the variation is from 8.1 to 13.7 tons, a difference of 5.6 tons per acre. It does not require much figuring to show the influence of variations of this kind on profitable and unprofitable cabbage culture.

In general, the seed secured for trial in 1909 was better than that secured the previous year. Of the twenty-five strains in the 1908 test four are worse than worthless. An average of the test for two years shows that not all of the plants matured until the last of September, and then, as at other times, the cuttings were made because the plant had grown all that it would, and not because the head was solid, for in possibly 90% of the instances the so-called head was nothing but a bunch of leaves. We have estimated that the actual value of the difference between the best and the poorer strain of this lot of seed may exceed $175.00 per acre.

The test of Early Spring varieties for the past two years has also shown some interesting features. While the majority of the strains are fairly good, yet there are among the others two that are Early Summer, and one that is Jersey Wakefield and several others are considerably off type or are mixed. This year the first cutting was made July 18. The photograph shows the relative earliness of the various strains, while the table shows the weight and total yield per acre.

Record No.	First Cutting		Total Yield per Acre	Record No.	First Cutting		Total Yield per Acre
	Heads	Weight			Heads	Weight	
		Lbs.	Tons			Lbs.	Tons
Check	40	106.3	14.4	Check	25	54.0	.....
1	34	78.5	12.2	13	25	55.5	10.1
2	32	61.8	9.8	14	(16) 5	9.5	11.7
3	28	48.5	8.6	15	33	69.0	13.0
4	21	50.6	13.7	16	42	79.0	9.9
5	26	63.5	13.3	17	22	60.0	7.5
6	8	16.8	10.9	18	34	100.5	15.5
Check	36	95.3	.....	Check	39	108.5	.....
7	28	54.5	9.6	19	37	94.8	14.8
8	9	15.3	11.3	20	(31) 26	49.5	10.4
9	23	49.3	11.0	21	13	26.5	10.2
10	13	23.5	10.3	22	(30) 28	47.5	10.5
11	27	60.3	12.1	29	32	75.5	13.5
12	34	70.1	12.1				

Strains of Early Spring Cabbage.
Nos. 4, 5, 6 and Check.

Considering first the number of heads harvested at the first cutting, we see that the number varies from eight to forty, or from seventeen to eighty per cent. Likewise the yield per acre varies from seven and one-half to fifteen and one-half tons—a difference of eight tons per acre. An interesting point here is that the best strain in the test was the poorest strain in the test of the 1909 seed of Jersey Wakefield, while the poorest of Early Spring ranked third best in the Jersey Wakefield test.

Interesting differences have been noted in the tests of Charleston Wakefield and Early Summer, but in general they run more uniform than the varieties we have just discussed.

Unfortunately the seasons have been unfavourable for the late crop, and thus we are unable to show results comparable with the early crop. Differences, however, have been noted in the uniformity of the various strains, as well as in their ability to resist drouth, insects and disease. The tests thus far have shown these characters to an appreciable extent, and will be the subject of further investigation in the near future.

The tests of varieties have proved very interesting. We now have in progress tests of thirty-three early and thirty-four late varieties. Some are probably new to a considerable portion of the public, and have merit, while a large proportion appear to be well-known varieties under a different name, and frequently the name is made up of a number of descriptive adjectives which are misleading. I have distinct recollection of one variety in our test that is being sold under four

Strains of Early Spring Cabbage.
Nos. 7, 8, 9, and 10.

names. Work of this kind is unfortunate, and something should be done to straighten out the jumble of meaningless names and place them on a basis that is reasonably accurate and reasonably scientific.

The work with tomatoes follows the same plan as that with cabbage. All of the plants are twice transplanted before being planted in the field, the second planting being made in three-inch paper pots. These are made of medium grade manilla paper and have given excellent results. The field planting may be made more rapidly and causes no apparent check in the growth of the plant, as is frequently the case when the plantings are made direct from the plant bed.

A comparison of the yield of twelve strains of Earliana for the past two years shows a difference of seven tons per acre. Not only is there a difference in yield, but there is a difference in the character of the fruit—a fact equally important from the standpoint of many producers. A corresponding test of Matchless shows a difference of five and seven-tenth tons per acre. In the larger experiment

started last year we have noted apparent substitution of varieties in several instances. In the variety test of sixty-two so-called varieties we have observed the practice of applying a new name to a well-known variety.

A test is being made for the purpose of determining the value of training to single stem and staking. The plants are planted in rows four feet apart, and the plants are set one and one-half feet in the row. In the check rows the plants are planted four feet apart. While the results are not considered conclusive, the indications are that the trained plants produce the first twenty-five per cent. of the crop earlier, and the yield per acre is about twice as great. However, the fruit of the staked plants seems to show greater tendency to point rot.

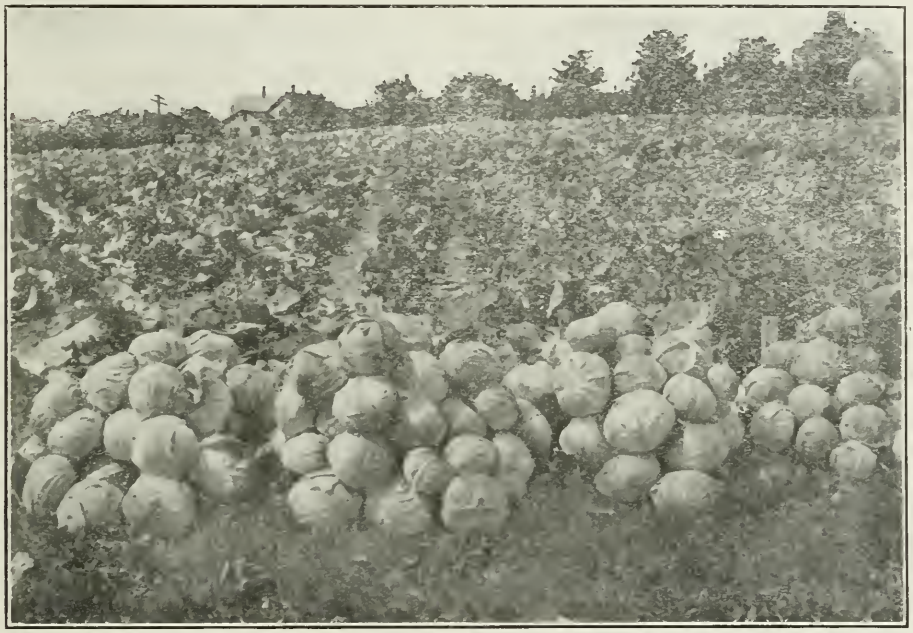
One acre of our experimental grounds is devoted to experiments with asparagus. On one-half of this area we are making a variety test of Bonvalett's Giant,

Strains of Early Spring Cabbage.
Nos. 14, 15, 16 and 17.

Connover's Colossal, Barr's Mammoth, Dreer's Eclipse, Palmetto and Argenteuil. Of these Palmetto has thus far proved the most satisfactory, both from the standpoint of yield and quality and from its ability to resist disease. The remainder of the plot is used for testing the importance of grading the crowns at the time of transplanting. This experiment is being conducted with the varieties Palmetto and Argenteuil. At the time of planting, the crowns were graded into three sizes, first, second and third, and two rows of one hundred plants each were planted of each grade. At the end of the first year the number of plants which failed to grow were respectively, thirteen, sixteen and thirty-four of the test of Palmetto, and thirty-eight, forty-nine, and eighty-five of the test of Argenteuil. These figures are significant, and especially so when we consider the expense entailed in making replantings, as well as the year of time lost and the accompanying diminished growth. Last year, at the end of the growing season, the

growth made by each of the tests was weighed and was thirty-one, twenty-three and fourteen pounds respectively for Palmetto, and fifteen, eleven and five pounds respectively for Argenteuil. The first cutting for market was made this year. The record of the product harvested was twenty-two, twenty-four and twelve pounds respectively for Palmetto, and thirteen, nine and five pounds respectively for Argenteuil. In each instance the difference is quite important, and is especially noticeable between the first and third grade, while the difference between the first and second is less, and in one case the yield of the second grade has been greater. The reason for this is unknown, but possibly may be determined later.

The experiments seem to show that a person in establishing an asparagus plantation could well afford to carefully grade his crowns and discard all except the very best.



Strains of Early Spring Cabbage.
Nos. 18, 19, 20 and Check.

Some work is being done along the line of seed selection. At the present time attention is confined to cabbage and tomatoes. We hope to be able to show how good seed may be produced, and the work thus far indicates that there are great possibilities along this line. It is generally conceded that judicious selection offers great possibilities in the improving of our general farm crops. In pursuing this work the important feature to be borne in mind is that the entire plant, and not the individual fruit, should be considered the unit of selection.

F. F. Reeves.—On behalf of the Association I move a vote of thanks to all the speakers and especially to the two who came from across the line to help us at our convention. Motion seconded by C. W. Baker, and carried.

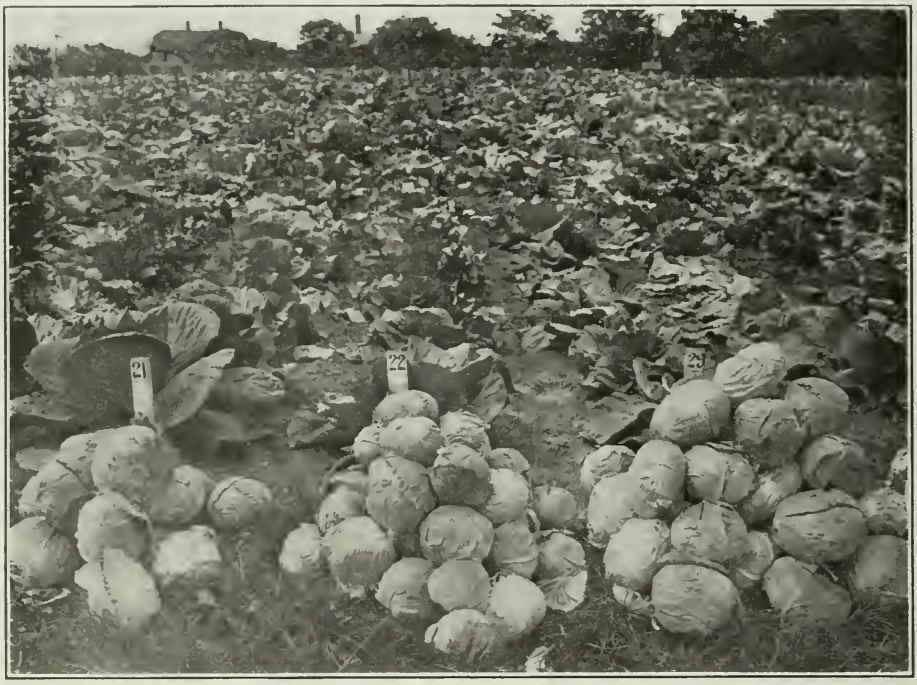
J. Lockie Wilson.—I have much pleasure in moving a vote of thanks to the Mayor and City Council of the City of London for the use of this Hall.

Motion seconded by J. J. Davis and carried.

The meeting concluded by all present singing the National Anthem.

REPORT OF THE OTTAWA BRANCH.

Through the active campaign inaugurated, we hope to greatly increase our membership the coming year. The fact that little was done the first few years of the Branch's existence, except to meet once a month, and listen to an address, often of a pretty dry nature, and engage in uninteresting discussions, lost to us many members, and our inability to get the French and Germans to join us has restricted our membership to a select few of the most energetic English-speaking gardeners. But we have had a rather interesting summer in 1910, having had four excursions to leading gardens, and to the Experimental Farm, during the sum-



Strains of Early Spring Cabbage.
Nos. 21, 22 and 29.

mer months, as well as regular monthly meetings the rest of the year. These summer excursions to the gardens have proved very interesting and beneficial, and we propose visiting some of the greenhouses this winter.

We also tried an experiment last season, in buying a quantity of seed direct from growers. This has opened our eyes to great possibilities in this direction. We were able to buy Selected Early Erfurt Cauliflower seed, of the best possible germinating power, that produced a superior quality of product, laid down at Ottawa, at 80 cents an ounce. We also secured Canadian grown onion seed at a very reasonable price that gave three times the stand got from seed of the same variety bought from a leading Canadian Seedsman, and sown the same day in the same field, and given exactly the same treatment.

We have been so encouraged that we propose going much more deeply into this experiment this coming season, and are now getting quotations on much of the seed we shall require, and we propose buying as an Association, and consider

that we can save considerable money, as well as avoid a great deal of the disappointment and loss we frequently have through sowing the seed bought from dealers. We have quotations already, which give us berry boxes at a saving of $1.00 per 1,000 on the prices we have been paying. This alone will pay most of us well for the expense and time we spend in the Association.

We are firmly convinced of the profit of membership, and active co-operation in the Association, and are determined to continue to uphold its principles as best we can, and we shall be pleased to get all the information and assistance we can get from anyone as to how we can interest and secure the membership of our brother gardeners of other nationalities.

Our Secretary returned from the convention at London, thoroughly enthused with the spirit of co-operation, and we earnestly trust that the members of the

Three Varieties of Cabbage. German Brunswick on the left; Magdeburg in the centre, and Glory of Enkhuizen on the right.

Provincial Association may see their way clear to visit the Capital City of the Dominion for the next convention, and we assure them that their welcome will be no less hearty than that accorded us at the City of London. Although our membership is not large, we claim a lot of the best fellows of the profession about the district, and we believe a provincial convention will greatly assist in enticing into our ranks the many other gardeners in this vicinity who owe it to themselves and their families to take advantage of the benefits our organization offers, and become active members, and enjoy the financial as well as mental and moral benefits. We think that a visit to Canada's Capital City, at Exhibition time, or during the sessions of Parliament, will prove immensely interesting to the western members, and coupled with a trip to the Experimental Farm, and other interesting sights of our beautiful city, should give us all a keener sense of our importance as citizens of a bright, prosperous, free and happy country.

In closing, we extend to our sister branches the warmest assurance of good wishes, and trust that the advancement made during the past year may continue till our great organization comprises every man, woman or child who grows a turnip, a carrot, or any other vegetable or fruit.

COMMERCIAL FERTILIZERS FOR VEGETABLE CROPS.

In plant growth, said Prof. W. P. Gamble, O.A.C., Guelph, speaking before the Toronto Vegetable Growers' Association, there are three main chemical substances which are absolutely essential, namely, nitrogen. phosphoric acid and potash, and a fourth, lime, the latter being usually present, however, in sufficient

Glory of Enkhuizen.
Heads averaging 8 lbs. when trimmed for market.

quantities in the average soil. In selling crops off the farm large quantities of these soil constituents are removed, and very often to get good crops these have to be replaced by stable manures or artificial fertilizers. Barnyard manure which may contain 15 to 18 pounds of nitrogen per ton, is not quite as rich in phosphoric acid and potash, but gives a large amount of vegetable matter to the soil, and has a mechanical effect on the soil not given by the application of commercial fertilizers. Barnyard manure, however, is slow acting and gives up its nitrogen more slowly than some of the nitrogenous chemical fertilizers. Of the purely nitrogenous fertilizers we have nitrate of soda, sulphate of ammonia and cyanamid; then the product of the packing houses, dried blood and tankage, contain much nitrogen and some phosphoric acid. Nitrate of soda is usually applied from 100 to 150 pounds to the acre; it is the most soluble of all artificial fertilizers and should be

sown in small quantities at different dates during the growing season. Sulphate of ammonia is also soluble, but on washing down in the soil it becomes somewhat bound up in other chemical compounds, but not in insoluble compounds on which the plants cannot feed. Care should be exercised in applying it for reasons which I shall explain later on. Tankage, etc., are still slower acting manures. Cyanamid is a grey powder and reacts very quickly with water, and for this reason should not be exposed to the action of atmospheric agencies before the time of its application to the soil, but it must be sown sometime previous to the date of seeding, because if applied along with the seed or at the time of seeding it may poison the germ or young plant. It is advisable, therefore, to apply it at least ten days to two weeks before seeding or before the young plants are set out.

Tankage, dry blood, etc., are slower in their action than the nitrate of soda or sulphate of ammonia, as they contain their nitrogen in an organic and in soluble form. They contain a large amount of nitrogen and are well suited to certain crops when immediate results are not looked for.

Phosphates.—No plant food is so slow in its action and so difficult of access to the plant as the natural phosphates in the soil. To a very large extent the roots only obtain the supply they need by direct contact with and the actual corrosion of solid particles of phosphate in the soil.

One of the chief sources of Phosphoric acid for plant food in commercial fertilizers is superphosphate, which consists of ground phosphate rock treated with sulphuric acid to change it into a form soluble for plant food.

Other forms are: Dissolved bone, which is ground bone treated with acid, ground bone, which is highly insoluble, and bone flour, which is a finer grade. These latter two act slowly in the soil and benefits are not usually obtained earlier than a year or more after date of application.

Still another phosphate fertilizer—basic slag, is a dark, ground powder which is obtained as a by-product in the manufacture of iron, and contains from 15-20% of phosphoric acid in the form of phosphate of lime. In England, France and Germany it is regarded as one of the cheapest sources of phosphoric acid, and is a very valuable fertilizer for top dressing clover sod and old pasture land. It is also valuable to apply to soils which are inclined to be acid in nature.

Basic slag, which is a cheap form in which to apply phosphoric acid, can be used to advantage in large quantities by crops which are gross feeders. If the soil is rich in vegetable matter or acid, the acids will help to dissolve the insoluble forms of phosphoric acid and make them available for the plant Acid phosphates should not be sown with the seed or too near the roots of growing plants, as injury may result Phosphates do not leach readily out of the soil, even when applied in a soluble form, as superphosphate, for instance, so they may be sown even the fall previous to good advantage: this is also true of potash commercial fertilizers.

As a supplier of potash, the oldest form of fertilizer in use is hardwood ashes, but with the advent of coal for fuel it is practically unobtainable. The forms now in use are the chloride of potash, or muriate of potash, and sulphate of potash, which are salts obtained in a fairly pure state in Germany, and which contain about fifty per cent. of potash, and are sown in quantities of from 100 to 200 pounds per acre.

The use of artificial fertilizers requires a certain knowledge on the part of the user as to the general influence of the three main plant foods, potash, phosphate and nitrate on the crop. A gardener has very different objects in view in the case of cabbage or tomatoes, for instance. In one case he wishes to produce thick, flesh leaves of good flavor and tender consistency, while in the other he wishes to

produce freely and abundantly fruit of good quality and withal of early maturity. Let us, therefore, remember that if anyone of the three above mentioned substances be wanting, no excess of the other two will make good the deficiency. On the other hand, if we give our crops a free supply of potash, phosphate and nitrate under healthy conditions they will grow as luxuriantly as the season and climate will allow.

Nitrogen promotes leaf and stem growth. So powerful is this influence, that the profitable character of fruit trees and fruit bearing plants may be destroyed and all their energies diverted to the production of coarse, rank shoots and leaves by too liberal an application of nitrogenous manures.

Phosphates promote fruitfulness and early ripening. Furthermore, phosphate is far more necessary in the garden and orchard than on the average farm, and an application of phosphates every year is a step in the right direction.

Potash improves the quality and color of fruit, and aids in the formation of starch and sugar. Before deciding as to the best means of providing potash, phosphate and nitrogen for his trees and plants, the horticulturist should first carefully consider the properties of individual manures already stated.

Fruit trees and vines are perennial occupants of the soil and do not yield the most profitable returns in ground which is over-rich in nitrogenous materials, and for these artificial supplies of potash are essential if fruit of highest quality is desired.

Potash salts should be applied in the autumn. The muriate is cheaper than the sulphate and appears to give equally good results in most cases. It is, however, a highly irritating and injurious substance if placed in direct contact with the rootlets of certain crops; e.g., strawberries. If it be desired to apply potash during the growing season, or to enrich potting soil with potash, the sulphate is the safest and best form in which to apply it.

Application of Fertilizers.—On a soil containing large quantities of lime use superphosphate as a top dressing in the spring and at the rate of 300 to 500 lbs. per acre. On soils containing clay or humus apply basic slag in the autumn and at the rate of from 500 to 600 lbs. per acre. In many cases still better results follow if a moderate dose of basic slag be followed by an additional dressing of superphosphate in the spring Avoid bones unless finely ground. Use steamed bone flour for special purposes.

Nitrogenous manures must be used with great care, and their successful use depends on good judgment and the provision of a simultaneous supply of potash and phosphate.

Plants grown for leaf and stem production, such as cabbage, asparagus, celery and rhubarb, can be liberally dressed with nitrate of soda in successive small doses, and provided that phosphates have been applied and there is no deficiency in potash, as much as 200 to 300 lbs. of nitrate per acre can be applied profitably. A light dressing of nitrate in the spring has been found of assistance to fruit trees at the time of setting the fruit.

Nitrate is injurious to the foliage of many garden plants and to vegetables with flat leaves, but does not harm upstanding blades of grass. In applying nitrate to plants in active growth care should be taken not to scatter it on the leaves.

Sulphate of ammonia is even more caustic to foliage than is nitrate, and requires careful sowing, but as it is comparatively permanent in the soil it can often be applied before the plants show leaf. Nitrate, however, has the preference for top-dressing purposes where a prompt and practically instantaneous result is desired. In wet seasons the sulphate of ammonia may be used to advantage.

Caution.—It must be remembered, however, that it is an easy matter to put on several times the intended dose of commercial fertilizer unless care be taken to regulate the amount. Excessive doses may, of course, result in killing the plant germ entirely, or in severely burning the growing plant. All fertilizers, therefore, must be carefully weighed, and the amount per acre applied should not exceed the quantity usually recommended. Fertilizers, it must be remembered, are very concentrated forms of plant food, which may act as direct plant poisons when present in a strong soil solution. The plant can only make use of food in a very diluted form, else the tender root hairs and rootlets are destroyed.

In order to secure uniform distribution of chemical fertilizers it has been frequently found advantageous to increase the bulk of material by mixing the fertilizer with dry earth, sand, or sifted wood ashes. This plan is specially to be recommended to beginners, for reasons already pointed out.

Cultivation Essential.

Good cultivation, and all it means to the tiller of the soil, has for its chief end the maintenance of sweet and aerated tilth in which soil organisms can grow and work freely. In order to secure this condition in general farm practice it is not necessary to cultivate deeply, as agricultural plants have become accustomed to a shallower depth of tilled soil, but for the garden, where the produce is so much more valuable and where such stringent conditions of cost of production do not obtain, deep and thorough tillage is essential. Fertilizers can only give their best returns when good cultivation is carried on at the same time—they cannot take its place.

In conclusion, every farmer or fruit grower must be his own experimenter and put questions to his soil. Only by conducting a series of small plot experiments with fertilizers can he find out what his soil lacks, and thus he is enabled to supply it with the fertilizer which his soil stands most in need of, and from an application of which he will secure the most economical returns. He must also bear in mind the characteristics of crops, and profit by the experience of others in this connection. Thus, certain crops are found to respond to the action of nitrogen in the form of nitrate of soda, while others respond more readily to sulphate of ammonia.

Purchase of Fertilizers.

It is usually far wiser and also more economical to purchase the fertilizing ingredients needed singly, and to do the mixing at home, rather than to buy mixed fertilizers. It is also better to buy a high grade fertilizer than a low grade, for by doing so one saves the additional cost of packing, transportation, etc. It is more economical to purchase one ton of high grade fertilizer than three tons of low grade. Remember further in purchasing, that the finer ground and the drier the substance be, the greater its value. Thus, the value of ground bone, bone dust, or ground rock phosphate, is largely dependent on the fineness of the particles. The finer the particles the more available and readily soluble the material. The greater the amount of moisture, the less the amount of fertilizing ingredients.

CULTIVATION OF CELERY.

W. R. Beattie, U. S. Department of Agriculture.

In all its stages celery growing requires a large amount of hand labour and this is especially true as regards the handling of plants and setting them in the ground where the crop is to be grown. If the plants are previously transplanted the work of setting in the open will be simplified, but the greater part of the crop is grown from plants direct from the seed bed. The plants for an early crop will have been set during the last days of April or early in May. These plants are generally started in the greenhouse and transplanted once or twice in order to get thrifty, bunchy plants that will grow rapidly. The late crop plants are set in the open from June 10 to 25 in most localities, although the writer has had success by planting as late as July 4 in the latitude of Washington. We hear a great deal at present about shearing back the tops of the celery plants before planting. Many writers recommend that the tops be cut severely by means of sheep shears or some similar tool.

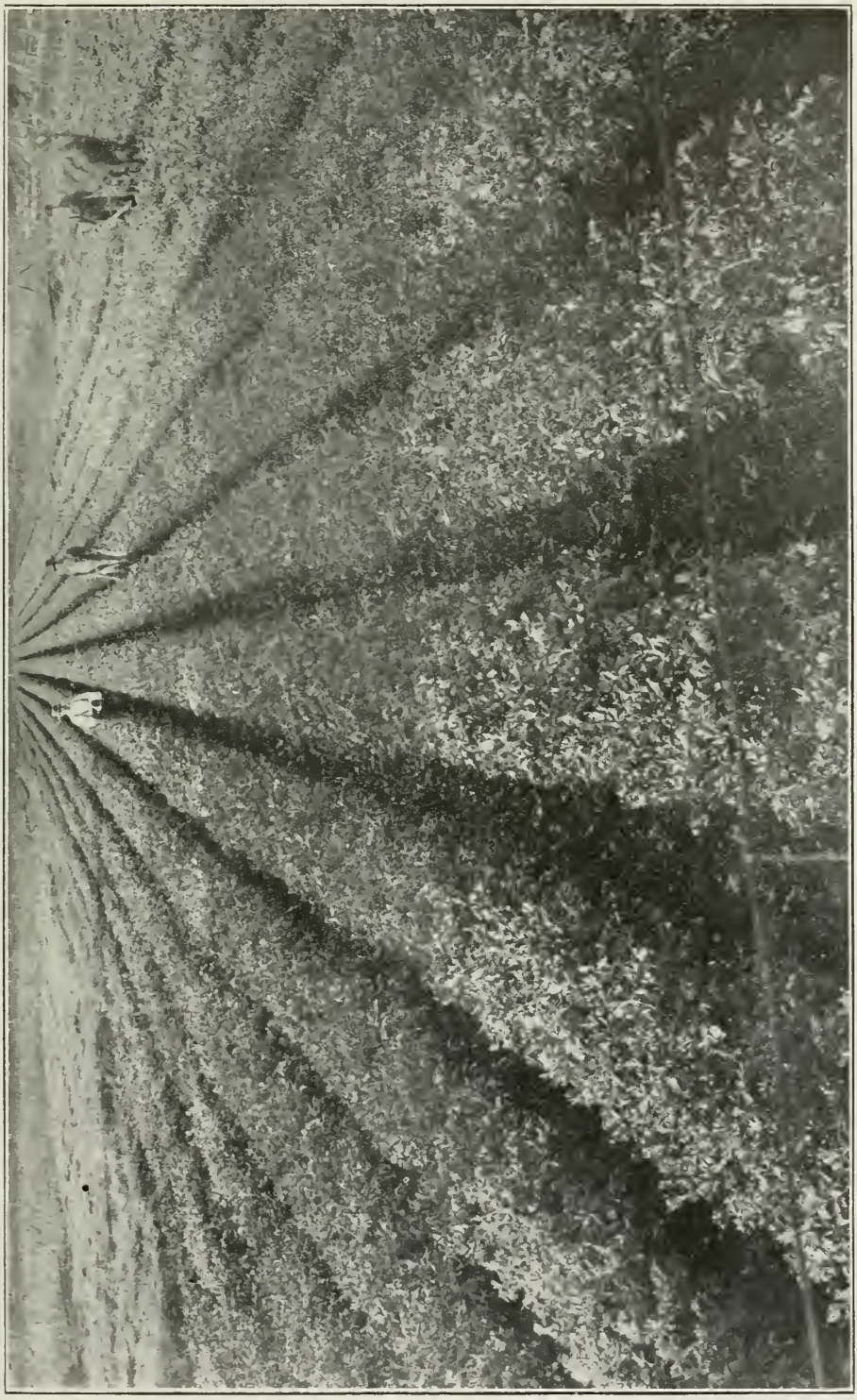
In some cases a lawn mower is used and the tops afterward raked from the bed. If the seed has been sown the proper thickness and at the proper time, if the soil was in good condition and watering has been attended to, yet not overdone, in short, if the grower is up to the art of growing celery plants there will be no occasion to resort to the shears.

When the celery crop goes wrong, when the stems are pithy or the plants shoot to seed, the grower is prone to blame the seedsman from whom he bought the seed, but the real cause generally lies in the fact that the plants have not been properly grown. Plants that are undersized and in good condition are preferable to overgrown, stunted, lopped-off stubble that has become prematurely aged and infirm. Transplanted plants will withstand shearing much better than those remaining in the seed bed, owing to their superior root system, which quickly refoliates the plant. If plants in the seed bed must be sheared to prevent their becoming too spindling the work should be done before they begin to crowd and several days before they are wanted for setting.

The Ideal Plant.

The ideal celery plant for setting in the open is about two and one-half inches in height, has seven to nine leaves and a massive root system, which, when spread in the ground, will extend over a space equal to the size of the top of the plant. There is such a thing as having too dense a root system, as is sometimes the case when the plants are grown in shallow trays in the greenhouse or cold frames. In case the roots have formed a solid mass this should be separated somewhat, or, in extreme cases, a part of the roots may very properly be removed. Where the plants have not been transplanted, the root system is seldom elaborate and will need no attention except possibly to pinch a portion of the top root in case it is of more than ordinary length.

In lifting celery plants from the greenhouse bench, the cold frame, or from shallow boxes, it is customary to run a knife blade between the rows of plants in both directions cutting the soil into cubes that are very convenient for handling in setting. In lifting plants from a seed bed they should be loosened by running a spade under the roots; then, by crumbling away the soil with the fingers, the



Celery Field. Thos. Benstead, Strathroy.

plants may be taken out without loss of a large number of their roots. The majority of writers dwell upon the importance of soaking the plant bed before lifting, but experience with celery has shown that it is not desirable to have the bed too wet and that the soil should be in good workable condition. The watering should be done the day before the plants are to be lifted in order that the tops may be dry and not become coated with earth in handling. Where the plants are to remain for some hours or days before setting, the roots should be dipped in a thin slime of rich clay soil and water before placing them in the boxes or crates in which they are to be transported. This process is termed "puddling" and serves both to supply moisture to the roots and to exclude the air and prevent drying. If desirable, a little cow manure may be added to this "dip," thus giving the plants a little fertilizer upon which to begin growth in the new situation. Boxes or crates used for the transportation of celery plants should be provided with a half-inch layer of wet sphagnum moss in the bottom to keep the roots of the plants moist.

The receptacle most commonly used for handling celery plants from the bed to the field is a shallow tin about 14 inches in diameter. Two methods of procedure are in vogue, one where the plants are lifted and carried to the field by men or boys who do that work alone, and where the planting is done by persons who remain in the field and do nothing but set the plants, and the other where the planter goes to the bed for his supply of plants. In some cases the planting is paid for at the rate of from 25 to 40 cents a thousand, but as a rule the plant setters are paid by the day.

On one of the best managed celery farms in the northern region the plant setters are paid by the day and lift from the bed and set in the field from 6,000 to 8,000 plants a day. The time required to take up the plants, sort and place them in the pans ready for planting gives the men a rest from the planting and each man can have his plants in the shape he desires. The owner of this farm explained that he desires a high grade of work rather than great speed, yet the planting out of 8,000 celery plants is no small day's work. Some growers employ boys to drop the plants a few feet ahead of the men who do the setting, but it has been found that very little can be gained by this method, as the men can select the plants from a pan almost as quickly as they can pick them up from the ground and the plants do not dry so much in handling.

Condition of Soil.

The condition of the soil at the time of setting has considerable influence upon the success of the work, in fact, it is impossible to secure a satisfactory stand unless the soil is in good condition. Celery is grown only upon land that is capable of being brought to a fine state of tilth; therefore it is merely a matter of fitting the land. The last working with the team should be with some tool such as a drag, that will level, pulverize and fill in all tracks and depressions. The rows are marked in various ways, the following being among those most frequently employed. A roller is provided with rings about one inch in height and of equal width; these rings set the proper distance apart for the desired width of row, and this tool is drawn by a horse across the field. By another method one-quarter or three-eighth-inch ropes are stretched across the field where the rows are to be placed, then a light hand roller is passed along on top of the rope, pressing it into the soil and also firming the earth for planting. The ropes are simply moved to the next row leaving a neat and very straight mark to guide the

planters Another method is to use a marker similar to that employed for marking out corn land. A marker in quite common use consists of a cross pole or header in which three or four wooden pins about two feet long are set sloping backward at an angle of about 23 degrees: to the header a tongue or pair of thills are attached and the device can be pulled by a horse, or, if made of light materials, a man can draw it. In using this device a line is stretched for a guide in marking the first rows, after which the outside marker is run in the last mark. A few growers employ a marketing wheel with short pins on the surface to indicate the distance between the plants in the row, but this has not been found of any particular advantage.

Methods of Planting and Distances.

Three principal methods of planting are in common use as follows:

Planting in single row, the rows three to four feet apart and the plants 4 to 7 inches apart in the row; the usual distance is 3½ feet between rows and the plants 6 inches apart in the row. Planting in double row, the rows 4 to 5 feet apart on centre and the double row of plants 5 inches apart each way in the row; the plants are generally set alternately. Planting in solid beds with the plants 6 to 9 inches apart each way, the idea being that the celery will stand so closely together when grown that it will blanch itself.

Of these methods that of planting in the single row will produce the best celery and will require the least labor.

The double row system is desirable where the available land is limited and where the soil is very rich; this system also has advantage where boards or paper strips are used for blanching in that the blanching material will serve for the double row as well as for a single row. There is little to be said in favor of the solid bed method of planting, as the celery so produced is generally small and poorly blanched.

Number of Plants Required.

To plant an acre by the single row system will require from 25,000 to 28,000 plants; by the double row system, 40,000 to 44,000 plants. In Florida the double row system is frequently employed, while on large celery farms of the North the single row system prevails, as here the blanching is done with earth, and the single row is more convenient for banking. At present strips of paper are being extensively tried for blanching celery, and the double row is well adapted to this method.

In setting the plants the men work upon their knees and astride the row. As each plant is set the planter moves forward by a rocking motion of the body which becomes very graceful and easy with practice. Knee pads that are covered with leather are sometimes worn, but on the soft mulch soils there is little need for protection of this nature. It is important that the plants should be set so that the crowns will be about even with the surface of the soil; if too deep, the soil will be washed into the heart of the plant, and if too shallow the plants will suffer from winds and want of moisture.

On the soft muck soils the plant setters frequently do not use a trowel or dibble of any kind, simply making the holes and firming the soil about the plants with the fingers. A planting trowel, similar to a small-sized mason trowel, is often used. The trowel being thrust into the soil at a convenient angle, the soil is raised a trifle and the roots of the plants slipped in, after which the soil is

returned to its original position by withdrawing the trowel. Another type of trowel has the handle bent at an angle of 45 degrees with the blade of the trowel. The common round dibble with a curved handle is most commonly employed. In use it is first thrust into the soil to make a hole for the roots of the plant, the plant is then placed by the left hand and the hole closed either by a second thrust of the dibble or by a stroke on the surface of the soil near the plant.

Too great care cannot be taken in the matter of having every condition just right for the transfer of the celery plants from the bed to the field. When planting on a large scale it would be impossible to set all the plants just before a gentle shower or to strike a "season" for the entire work. On the other hand, considerable labor would be required to water in a large area, and the use of water must often be dispensed with. On many of the marsh areas it is possible to raise the water in the ditches so that the soil will become thoroughly moistened for

Section of the Pupils' Department at Galt Exhibition. This Exhibit was in charge of the Local Representative of the Department of Agriculture, and has proved a valuable educational feature.

planting. Some growers practice watering the rows ahead of the planters, others water after setting the plants. The method pursued will depend largely upon the character of the soil, the available labor, and natural facilities for doing the work. It is always important that the soil should be firmly packed about the roots and no loose or air spaces left to become dried out in case drying weather follows transplanting.

The work of setting the plants is certain to pack the soil and leave it more or less irregular, and, in order to loosen it, a wheel hoe or small tooth cultivator should be run along the rows shortly after planting. After cultivation the plants should be gone over and any that are poorly set or fail to stand up should be replaced or properly set. Replanting should be repeated at the end of a week; however, if the work has been properly done in the first place, very little replanting will be necessary.

Transplanting Machines.

Machines for such plants as cabbage, tomatoes and tobacco are in common use, but the transplanting of such plants as celery, onions, and lettuce presents a more difficult problem. These machines would successfully transplant celery except that no team can walk slowly enough to permit the plant dropper to set the plants closely enough together. Two smart boys on the dropper seats of one of these horse-drawn machines can set from 60 to 72 plants a minute, which, at the rate a steady team will walk, permits of placing the plants as close as 14 inches in the row, or possibly 12 inches apart for short distances. The writer is now experimenting with a traction transplanter geared to run very slowly and which it is believed will prove a success in setting celery, lettuce and onion plants. This machine carries a water barrel and transplanting mechanism as the horse-drawn outfits and can be run at any speed between 20 feet to 90 feet a minute. The weight of the machine, including the driver, two boys to drop the plants and a full load of water, is about 2,400 pounds. The cost of such a machine would necessarily be from $1.000 to $1,200.

Storage.

Years ago, when celery growing was a new industry, many persons made a specialty of storing the crop for winter use. During recent years California and Florida have so plentifully supplied the market during the winter months as to render storage unprofitable except under the most favorable conditions. By far the greater use for storage of celery is found in the caring for home supply when grown in the garden.

The secret of success in storing celery is to keep it as cool as possible without freezing, and at the same time provide plenty of ventilation. A dry atmosphere is preferable to one that is moist. Ordinary cellars are not adapted to celery storage on account of both warmth and moisture.

There are about four methods of storing celery, including the covering of crop in the rows where grown. trenching, placing in pits and storing in cellars or especially constructed houses.

Where a small quantity of celery is grown for home use it may be banked well up to the tops with earth, then covered with leaves or straw and the covering held in place by means of boards. As the weather becomes colder, the covering is increased to keep out frost. Celery stored in this manner will keep better than by any other method, but it is difficult to remove during cold weather.

Trenching.

In the northern celery fields many of the growers follow the practice of trenching the last of the crop in order to hold it until it can be marketed. A trench is opened with the shovel or a double furrow is thrown out with a turn-plow to a depth of ten or twelve inches. Five or six rows of celery are brought together and packed closely in the trench with the roots slightly covered with soil. When the trench is filled, the soil is banked up along the sides almost to the tops of the celery. Sometimes boards are set on edge along the celery to prevent the soil sifting down into the hearts of the plants. If the celery is to remain long in the trenches a covering of leaves, straw or corn fodder is placed over the tops to keep out the cold. The entire trench is generally removed and marketed

at one time. This method is adapted only for holding celery for a short period and not for winter storage.

For storing celery on a small scale, as for home use, a pit similar to that of a regular hotbed is desirable. If the pit is to be constructed, the earth is first thrown out, making the excavation fourteen to sixteen inches deep, four to six feet wide and of any desired length. Planks are supported on stakes along the sides, those on one side being a few inches higher in order to give slope to the roof. Before bringing in the celery about four inches of loose top-soil, in which to bed the roots of the plants, should be spread in the bottom of the pit.

The celery is lifted with considerable earth adhering to the roots and is set in rows across the pit. The rows should be about four inches apart to allow the air to circulate freely between the celery, but the plants may be placed quite closely in the row. Open a small trench by means of a spade, bed the roots in this trench, then return the loose soil and pack slightly about the roots of the plants. When in place, the celery should be thoroughly watered and the covering of the pit left off until the foliage and stems are entirely dry. For a covering a roof of boards supported upon cross pieces is most desirable. Tar paper roofing should not be used as the odor may injure the flavor of the celery. In addition to the boards it will be necessary to provide a covering of earth, leaves, straw or coarse manure to keep out frost.

During the first week or two after storing the celery in the pit numerous openings should be left for ventilation; later, as the weather becomes colder, the pit should be made tight and additional covering put on. The greatest danger lies in sudden changes in temperature which may catch the grower unawares and a single freeze may destroy the entire crop. It is surprising how much frost celery will stand while in the rows where grown, but it seems to be much more susceptible to injury from frost after having been in storage for a short period. When celery becomes severely frosted while in storage, decay will soon follow and the crop be an entire loss.

Where hotbed frames are available they form an excellent place for storing celery, the sash being used as a covering and boards placed on top to prevent the glass from becoming broken.

The storage of celery on a large scale is only practicable by the aid of special houses for the purpose. The type of house best adapted for this purpose is built partly above and partly below the surface. A very common form of celery house consists of outside walls about thirty inches in height and nine inches thick, upon which there is an even span roof of boards and shingles or a heavy paper roof. In order to make the roof frost proof it is ceiled inside with matched lumber and the walls banked with earth on the outside. Numerous ventilators are placed along the ridge and in some cases provision is made for admitting cold air near the floor by means of eight or ten inch tiles inserted at intervals in the walls. Both the top and bottom ventilators are securely closed during cold weather, but during mild weather they are opened during the night and closed in the daytime. As mentioned above, the essential in celery storage is to provide plenty of ventilation and keep the temperature of the storage house as low as possible without actually freezing. Some gardeners go so far as to provide electric fans for circulating and changing the air, while others depend entirely upon manipulating the ventilators to the best advantage.

While the self-blanching varieties of celery are most universally grown for early marketing, the sorts that do not blanch so readily have been found to keep better and are most commonly used where the crop is to be stored for any length

of time. Among those most commonly used are Giant Golden Heart, Giant Pascal, Winter Queen and similar varieties. Celery intended for storage is as a rule not blanched to any considerable extent while in the field. The usual plan is to throw enough earth to it to keep the plants in an upright and compact form and to depend upon completing the blanching in the storehouse. The storage of celery is deferred until as late as it is safe to do so, then it is lifted with most of its roots attached and hauled direct to the storehouse.

In handling the crop, bushel boxes or crates are sometimes used, but more often the celery is simply gathered in bunches and piled upon a low platform wagon for transportation from the field to the house. At the house the celery is carried by the armful and put where it will be within the reach of the persons who are placing it. The doors are in the ends of the storehouses, and, in a few cases, these are large enough to back a wagon into the house for unloading.

Digging Celery.

Where large quantities of celery are to be handled some form of digging machine with a U-shaped bar for running under the celery is employed. The plants may also be loosened by the aid of a turning plow from which the mould-board has been removed. The celery should not be allowed to lie exposed to the sun and wind, but hauled to the storehouse as rapidly as possible after digging.

The earth floor of the storehouse is covered with about four inches of sandy, loamy soil, and as a rule is divided into beds running lengthwise of the house. A slight trench is made with a spade or square-pointed shovel, and the celery bedded in the same manner as described for the outside pit. After the celery is in place the roots are thoroughly watered by inserting a hose between the rows, in fact, it is desirable to keep the foliage as dry as possible at all times while in storage. Watering at the roots may be necessary every week or ten days, depending upon weather conditions and the consequent moisture requirements of the celery plants. A certain amount of growth continues while the celery is in storage, a very fine grade of heart leaves being formed.

Use of Shelves.

In some of the larger houses the celery is stored upon shelves, one above the other, but this is no great advantage as the cost of lumber for the shelving is considerable and it is more difficult to place the celery upon the shelves. Another objection is found in the liability of water dripping from one shelf upon the celery in the one below and thus injuring or decaying it.

It should be borne in mind that celery is easily injured by anything having a pronounced flavor or odor coming in contact with it. Sometimes it is necessary to employ a little artificial heat to keep the celery from freezing while in the storehouse, but this should always be from a source that will not give off odors of creosote or smoke. Oil stoves and lamps are also objectionable for the same reason. A small stove connected to a good flue or chimney is perhaps the best source of heating, unless hot water or steam heat is available. Frost forming on the inside walls will do no harm, but, when the frost begins to form, it will be time to keep a close watch of the thermometer and have the stove ready for action.

The storage of celery, except where cold storage facilities are at hand, is not profitable unless a special trade can be secured. The essentials of success are: first, a solid, well-grown stock, free from disease and frost injury. In storing,

the plants should be handled quickly and with extreme care to prevent bruising and other injury. The conditions in the storage house should be the best possible and every sanitary precaution taken. If the celery was lost through decay last season, the soil in which the plants are bedded should be removed and fresh soil put in its place. The interior of the house should be sprayed with formalin, one part to nine parts of water. Another method would be to fumigate the house with sulphur a short time before beginning to store the celery. The secret of success lies in keeping celery cool and well ventilated while in storage.

HEATING AND WATERING IN WINTER.

B. H. Thorne, Wooster, Ohio.

Watering in my greenhouses is done mostly by sub-irrigation; the only surface watering is to start off newly-set plants or to water in the manure mulch used on tomatoes, cucumbers and the first crop of lettuce.

My sub-irrigation tile are laid level, mostly at the bottom of the bed, about a foot deep, but in one house just below the surface. The deep laid tile are eighteen inches to two feet apart and are used for soil steaming and soil warming as well as for watering. The deep laid tile do fine work at watering, except that they use more water than any other form of watering. The shallow tile water more quickly but more moisture comes to the surface. The beds are made on a clay sub-soil and the deep laid tile are laid either on or in the sub-soil. The sunken walks are made fairly water-tight with four-inch concrete walls.

The advantages of sub-irrigation are these: I can water a house 140 by 40 with only a few minutes of labor. This house has been carried for six weeks in winter and ten days in summer with one watering.

In case it is necessary to water lettuce after it is nearly grown, it can be given a light or medium watering and the crop carried through, with no water on the plants to weigh them down or lodge them, and it leaves the surface of the soil comparatively dry. I have watered tomatoes all winter with sufficient water by doing it often and left the surface of the soil almost dust dry.

Over-watering seems to be impossible, for I have had water from the deep laid tile flow over the top of the bed and no damage was done.

Sub-irrigation is largely preventive of stem and soft rot if the ventilation has been properly attended to.

It does not compact or harden the soil. I tramp my soil with the feet before planting.

The Ohio Experiment Station has been very successful with sub-irrigation on water-tight raised benches, especially with lettuce.

The past summer I accidentally sub-irrigated a small Onion patch outdoors through mole runs and at the end of four weeks the soil was fairly moist though no rain had fallen.

Heating in the Winter.

This subject no doubt has been fairly well settled to most minds, but I confess that I know less about it now than I did a few years ago. I have three houses in which the temperature does not vary more than one degree on a still,

cold night. With the outside temperature at ten or below, I can carry either one of these houses at forty with half its radiation, while it requires all of it for fifty-three to fifty-five. Does it require double the head to raise the temperature twelve to fifteen degrees? It does with me, but this point will have to be determined for each individual plant.

Will the rather high night temperature of fifty degrees for lettuce, advocated by the Ohio Experiment Station be profitable? I think it will, because it keeps the soil warmer.

The Ohio Experiment Station is located only two miles from me. In their greenhouses all their beds are raised benches save one, which is on the ground. Some of these benches have a few heating pipes low down underneath and others none. Their lettuce temperatures are fifty at night and about fifty-eight to sixty

Soil Sterilization Experiment by Michigan Experiment Station. Soil in this house was not sterilized. Poor growth of cucumbers due to presence of nematodes in soil.

with ventilation during the day, while mine are forty at night and sixty-three to sixty-five in the day time and sometimes higher on brighter days. In other respects the two plants are conducted pretty much alike.

With these differences they are enabled to finish a lettuce season of three crops in an average of four weeks less than I. Why this difference? I think it is largely due to soil heat. Their raised benches allow the air to circulate all around them and warm up the soil faster than when the beds are on the ground. They tell me that the lettuce on their ground bed is two weeks later for the mid-winter crop than on the other beds. Their crops are as good on the raised beds as on the ground bed. This applies to radishes also. They are also ahead with the spring tomato crop and always finish before the prices begin to tumble near the end of July. They start their fall tomato crop later and beat me at the finish. This is due, first to a mild bottom heat which warms up the soil in the morning faster than on ground beds, and, second, to the confining of the roots on the shallow benches.

Soil Heat.

Is soil heat or sub-heat an aid to the vegetable grower in the Winter? I am certain that it will be found so after the proper relation between soil and atmospheric temperatures has been carefully worked out for each crop. Eastern cucumber growers have used a small hotbed under each row of cucumbers. The florist uses bottom heat, as they call it, for carnations, roses and for bulbs, as much as 100 degrees for some of them. They get a larger number of flowers in the winter months from the raised benches than from the ground beds.

Last fall my tomatoes had an uncomfortable way of wilting with the early morning, but by noon or soon after they were all right. Watering did not help. I diagnosed the trouble as cold feet and placed a thermometer four inches in the

Soil Sterilization Experiment by Michigan Experiment Station. Soil on left was sterilized with live steam through drain tiles 18 inches deep and 2 feet apart. That on right was not sterilized. In every other respect treatment was the same. Difference is due to destruction of nematodes in soil by the sterilization.

soil. Imagine my surprise to find the maximum soil temperature only fifty-seven, as against eighty atmospheric in the shade. I began immediately to run hot water in the deep laid sub-irrigation tile for a few minutes every other day. In this way I ran the maximum soil temperature up to seventy. In a very few days the wilting stopped and the foliage began to look healthier. This treatment was kept up all through the rest of the crop and they did not wilt again.

Did you ever place thermometers in your ground beds and watch them for a week? If not, you may have a surprise awaiting you. After a crop shades the ground the sun does not get a chance to warm it up and it must be warmed up from the surrounding air. After two months of hot summer weather and rarely a cloud in the sky, a thermometer placed four inches in the ground beds of a tomato house registered only seventy-five, and at twelve inches, seventy maximum,

while the thermometer in the air was ninety five. The maximum soil temperature was not reached until after the air thermometer was going down. The greatest range between soil and air temperatures was over twenty-five degrees inside, while the greatest range I could find outside at the same time was ten. The soil temperature near the surface goes up very slowly, while at twelve inches deep it was fairly constant as between day and night.

The short, hot days of early fall make heavy demands on the foliage of tomato plants and the roots are hardly able to meet that demand until the soil temperature has been increased.

Nitrification in the soil begins just above freezing, but does not reach its maximum until up in the eighties. Is it possible that this has anything to do with the difficulty of growing fall tomatoes? I hardly think so, but I have had beneficial results from using one pound of nitrate of soda per 100 square feet.

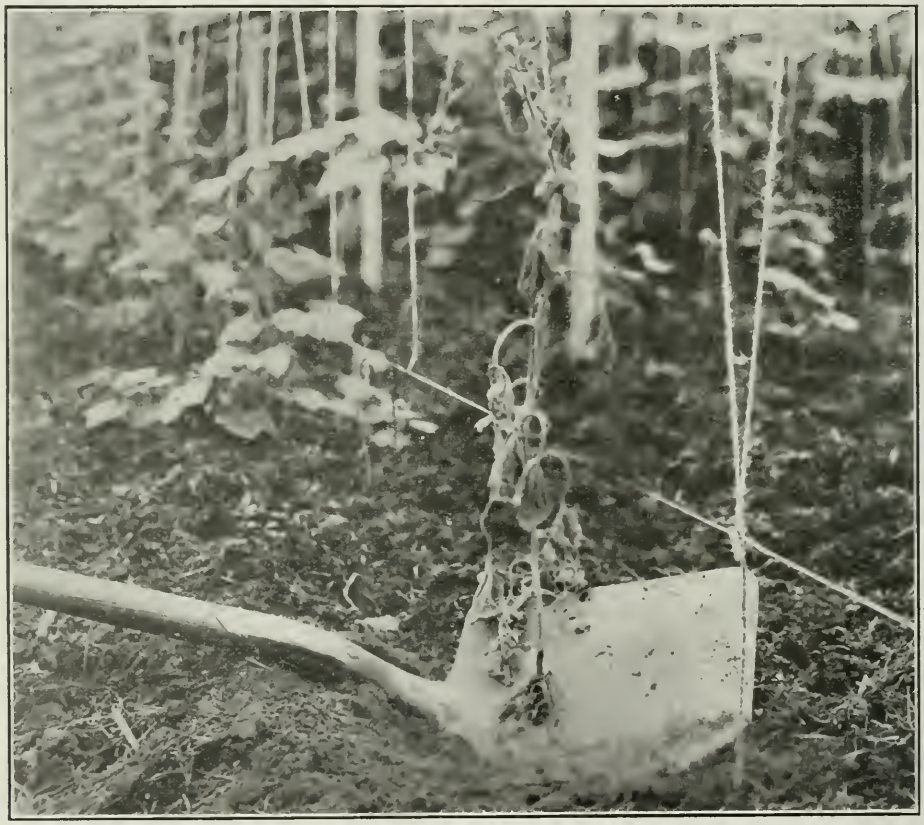
Soil Sterilization Experiment by Michigan Experiment Station. Soil in this house was sterilized by live steam run through drain tiles 18 inches deep and 2 feet apart. Nematodes were destroyed by sterilization, hence fine growth of plants.

Judging from my own slight experience and a comparison of my houses with the Ohio Experiment Station, increasing the soil temperature with a lowering of atmospheric, will have an accelerating influence on the growth of the cooler grown crops, and bringing the soil temperature up to a point near the atmospheric will have a good influence on tomatoes and cucumbers. The proper relation between soil and atmospheric temperatures for the different crops to produce a maximum yield in the shortest time in winter can only be determined by experiment, and I believe this point has been overlooked by the experiment stations.

I do not think that hot water is the best means of sub-heat. Hot water or steam pipes properly valved so as to control the heat and laid down deep in the soil would be much better.

The influence of leaf-spot of tomatoes by the range of atmospheric temperature has been very great in one of my houses. This house is sheltered at the

north end by a two-story building, with the boilers in the cellar, and the warm air from the cellar comes up into this end of the house. The temperature in this end does not vary more than 12 to 15 degrees in the winter, while at the other end the variation is as much as 25. The vines at the north end are green till the end of the crop, while at the other end they are blighted up to the top. This has happened on every crop grown for ten years. A range of more than 15 degrees, especially in cloudy weather, begins to induce leaf-spot. I have had the best success in holding off leaf-spot in the spring by firing every cool or cloudy day. By firing I have held it off on an average of two weeks. Last year my last firing was done on July 4th.



Soil Sterilization Experiment by Michigan Experiment Station. Cucumber plant killed by nematodes on roots, growing in soil which was not steam sterilized.

Sub-heat on Out-door Crops.

My only experience has been on rhubarb. If you can sell short stalks, rhubarb can be forced in the open air as soon as winter breaks, providing it is pulled when in danger of being frozen. If the stalks must be of one length a covering of canvas or roofing material will be necessary and enough heat used to keep it from being frozen. A gain of from two to four weeks can be made in the open air on such crops as rhubarb, asparagus, winter onions and possibly

other crops by the use of sub-heat in drain tile laid a foot or so deep. It takes an immense amount of hot water, so that steam would be better.

Sub-heat, I think, will be an important factor in accelerating the growth of most all of our winter vegetables. The soil temperature at four inches goes down to the minimum atmospheric, and does not reach its maximum in the day until afternoon, when it is considerably below that of the air, so that the temperature above the average lasts only a few hours.

If it is possible to grow the same quantity of greenhouse vegetables in four weeks less time on the average, as the Ohio Experiment Station with its raised benches and mild form of bottom heat has done for ten years, in comparison with my ground beds and no bottom heat until this past year, we all want to know as much as possible about it.

HUMUS AND POTATOES.

The control of moisture in land to be planted in potatoes is of great importance and cannot be secured by drainage alone, as it is largely a matter of the humus-content in the soil. One hundred pounds of clean, dry sand will take twenty-two pounds of water to saturate it; 100 pounds of our ordinary clay loam soil, perfectly dry, will take fifty-six pounds of water before it will become saturated, while 100 pounds of perfectly dry leaf moil soil will take 196 pounds of water to saturate it, or nearly nine times as much as it takes to saturate an equal number of pounds of sand, and three and a half as much more as it takes to saturate our ordinary clay loam soil. With a soil deficient in humus, no amount of cultivation or commercial fertilizer in a dry season can make it produce a paying crop of potatoes, while a soil filled with humus can be made by cultivation to produce a paying crop even in a season of practically no rain. A clay loam soil filled with humus can be worked much more quickly after a heavy rain than the same soil which is deficient in it, and the capacity of the humus-filled soil to hold moisture is so much greater that with intelligent shallow cultivation a good crop is practically assured.

The control of moisture is not the only advantage of having a soil filled with humus. The rock-formed soils of the eastern portion of our country are filled with mineral plant food. It is claimed by leading scientific men that the top eight inches of heaviest loams contain potash enough to raise maximum crops from two to four hundred years, and phosphoric acid from one hundred and fifty to three hundred years, but they are locked up in an insoluble form; a wise provision indeed to prevent man leaving the face of nature a barren waste. Fill a soil with humus, which is decaying organic matter, and the acids formed in this process help to break down and set free some of this locked up plant food. The second eight inches contain as much, or even more, mineral plant food than the first. The productiveness of our soils depends more largely upon their humus-content than upon any other one thing, and one of the first objects of the potato grower should be to fill his soil with this decaying vegetable matter.

TO PREVENT POTATOES SPROUTING.

A German publication gives a new method for keeping potatoes from sprouting, which consists in placing them on a layer of coke. Doctor Schiller, of Bruns-

wick, who has published the method, is of the opinion that the improved ventilation by means of coke is not alone responsible for the result, but believes that it is due to the oxidation of the coke, which, however, is a very slow one.

Coke always contains sulphur, and it is very possible that the minute quantities of oxides of carbon and sulphur, which result from the oxidation, mixing with the air and penetrating among the potatoes, are sufficient greatly to retard sprouting. Potatoes so treated are said to keep in good condition until the following July.

Storing Seed Potatoes.

Seed potatoes in storage have three very definite requirements. They must be kept in a place that is cool, well ventilated and dark. That the potatoes be kept cool is most important. The best temperature is from 33 to 35 degrees. If the temperature falls below 32 degrees there is danger of freezing, although it takes a slightly lower temperature to freeze potatoes than water. Good ventilation is necessary in order to prevent the spread of rot, and it is well to keep the potatoes dark, so that they will not start to sprout at any time. A cool, dark, well-ventilated cellar that is fairly dry is the best place to store seed potatoes on the ordinary farm. As spring comes on, seed potatoes should not be allowed to send out the long, pale, spindly shoots that are so often seen. This may be prevented by keeping the potatoes cool and dark. Some of the Eastern growers, three or four weeks before planting time, spread their seed potatoes out in the light at a temperature of 60 to 70 degrees, and here allow them to develop sprouts a half to an inch long. These are strong, stubby little sprouts, that are not broken off in planting. It is said this process both hastens the maturity of the crop and increases the yield. But to allow potatoes to send out long, spindling shoots that are easily broken in handling is a bad thing for any kind of potatoes, seed or market.

THE ONION MAGGOT.

The Onion Maggot has been the cause of considerable damage to the onion crop in many of the commercial onion growing sections. The maggot which causes the injury is the larva of a fly, about one-fourth of an inch in length. The winter is generally spent in the adult stage, the fly hibernating in rubbish or in crevices under loose bark, and emerging in spring for egg laying.

The egg is said to be about one-twenty-fifth of an inch in length, oval in outlines and white in colour. It can be seen by the naked eye upon close examination. The eggs are deposited on the young plants or on the ground nearby. The period of incubation is said to vary from four to ten days. The newly-hatched maggots make their way to the young plants and feed until grown, when they leave the plant and form a puparium in the ground from which they emerge as adults in early summer. There may be several broods during the season.

Dr. J. S. Smith reports carbolic acid and lime as the most effective material tested as a remedy for the maggot. The applications should be made weekly with great thoroughness, so that the surface of the soil about the plants is thoroughly coated. It is probable that the material acts as a repellant to the adult, as well as preventing the young from reaching their food supply if the eggs should be laid near the protected plants.

To make the material, slake the lime to a thin cream. Use three pints to a gallon of water, and to this add one tablespoon of crude carbolic acid.

All infested plants should be removed and destroyed with the maggots in them as soon as discovered. As far as possible, land which has been infested during the season, should be planted to some other crop the next year rather than to onions.

TWO-STEM SYSTEM OF TRAINING TOMATOES.

L. M. Graham, in the *Market Growers' Journal*, gives directions as to training tomatoes to two stems, which he finds just as good and even better than the single stem system, giving practically as much early fruit, quite as large and just as early:

"Our system of supporting the plants is to set one permanent post at each end of the row, then set in 2 x 2-inch stakes 7 feet long at intervals of 8 feet along the row. We set plants 24 inches apart in the row, rows 4 feet apart. We find making the row 4 feet apart will allow of horse cultivation.

When the plants have attained 12 inches in height, we stretch Number 12 galvanized wire about 8 inches above the ground, tacking wire to the 2 x 2 stakes and end posts. Continue to put on sufficient wire as the plants continue to grow, usually placing the wires 8 to 10 inches apart. Tie the plants to wire with soft twine or raffia, which is very suitable for the purpose.

This we find much cheaper than using a stake for each individual plant, as wire is much more easily secured with us than stakes and will last much longer if taken care of.

This system will permit of training each plant to two stems, thus spreading the two stems apart slightly as the plant continues to grow. The way to get the extra stem is to allow one side shoot to remain at time of training, which will soon grow and throw out its own side shoots which will necessarily have to be taken off. Those growing staked tomatoes on a large scale will find this system very satisfactory; at least it has been so with us.

PROTECTING COLD FRAMES WITH CLOTH.

Oiled cloth is frequently used over cold frames for growing vegetable plants as cabbage and lettuce. Some growers claim that cloth is just as serviceable as glass, but the majority of men prefer glass. The cloth is not so durable, of course, as glass, but you can get good results if additional protection is given at night or in cold weather by the use of mats. Oiling the cloth makes it more durable and warmer, and it turns water better.

NOTES.

Quality in food products is being sought for to-day as it never was before. A large proportion of the consumers are asking for the best and willing to pay the prices demanded for those of highest quality. Market gardeners should bear this in mind, because the satisfaction derived from the use of vegetables of the best quality always induces an increased demand therefor.

Where stable manure is not easily obtained it is possible to get good results by ploughing under green manure crops, which increase the humus in the soil and make it available to grow all kinds of vegetables.

In the County of Middlesex, England, the potato principally grown is the Magnum Bonum. Strawberry plots are cropped for three or four years, the distance between rows being two feet nine inches and plants are set two feet apart in the row. The Paxton is a popular berry. A salad beet of a round, medium size is grown, which brings in returns of £50 per acre. On one farm sixty men and ninety women are employed in the picking season.

Double glass sashes are used in some parts of the United States to maintain higher temperature in greenhouses and frames. This is an advantage in preventing breakages, but the additional weight is a great objection when they have to be handled frequently.

No crop is more easily grown under glass than rhubarb. The roots should be lifted and frozen for a few days before used for forcing.

Temperatures favorable for growing radishes and lettuce suit rhubarb just as well. When forced under low temperatures the stalk grows heavier. Subdued light induces a more tender stalk and one milder in quality than when grown in the open ground. Garden soil of a light, open texture is suitable for this purpose.

REPORT OF DELEGATE TO AMERICAN VEGETABLE GROWERS' ASSOCIATION.

F. F. Reeves, Humber Bay.

It was my good fortune to be sent as representative of the Ontario Vegetable Growers to the Third Annual Convention of the American Greenhouse and Vegetable Growers' Association of America, held at Grand Rapids, Michigan, during September, 1910.

Grand Rapids is an ideal place for a convention of this description, as it is the centre of the Michigan fruit belt and celery section.

There are sixty greenhouse establishments in or near the city with over fifty acres under glass, most of which is devoted wholly to vegetable growing.

There were upwards of 300 delegates present, representing eighteen States of the Union, with a contingent from Ontario.

A noticeable feature of the convention was the fruits, vegetables, and market garden and greenhouse supplies, and equipment. There were many firms represented, and the exhibits aroused a great deal of interest.

The programme was very extensive and full of interest to all classes of vegetable growers, and I have never attended a meeting where better addresses and papers were given. The speakers had evidently given their subject much study, and the interesting reports and suggestions were much appreciated.

The afternoon of the second day was given over to a trip of inspection of the various orchards and greenhouse plants in the vicinity of Grand Rapids. One of the principal places visited was that of Eugene Davis, the home of the Grand Rapids lettuce for greenhouse culture, also Davis wax bean and Perfect cucumber. all the houses here were planted with lettuce and cucumbers..

Experiments in soil sterilization by steam were being carried on in connection with the Michigan Agricultural College. The larger part of this cucumber house had had the soil sterilized, and the plants were over six feet high and very healthy. To demonstrate the effectiveness of the method, one portion of the greenhouse had been left untreated, and in this it was found that the plants were not only very small as compared with the ones treated, but were wilted and dried up, showing plainly the work of the eel worms. The method employed is to run live steam through the drain tiles in such a way as to kill all germs and organisms.

It is just a question between sterilizing and renewing all the soil annually, and the sterilizing is the cheapest and more certain method.

The Skinner system of irrigation was in operation in most of the gardens, and was evidently doing good service on a soil naturally dry and sandy. Some of the heaviest crops of lettuce that I have ever seen were on a very light soil, but with plenty of water, thanks to overhead irrigation.

One of the best papers read, and one that applies to us as well as to our American friends, was by Mr. F. J. Zuck, Erie, Pa., on "Results of Local Organization." He enumerated some of the benefits as follows:

A better price is maintained on the local market.

A better feeling prevails among the growers.

By means of an association co-operative buying and consequent lower prices are possible.

An organization receives more consideration from transportation companies than the individual grower.

The smaller dealer is protected, because, as far as possible, a uniform price is maintained.

By means of organization the market is supplied with uniform packages.

LIST OF DELEGATES.

Name	Address
Aymer, Chas.	Humber Bay
Baker, C. W.	Tamblings
Bates, Thos.	London
Baty, T.	Tamblings
Baty, Thos.	London
Broughton, Henry	Sarnia
Burnett, Jas.	Lucan
Bycroft, G. W.	Byron
Cody, A. J.	London
Craig, Wm.	Byron
Crow, J. W.	Guelph
David, J. J.	Byron
Dawson, S. D.	Tamblings
Delworth, Thos.	Weston
Dempsey, D.	Stratford
Dengate, R.	Ealing
Detch, Geo.	The Gore
Dugal, John	Tecumseh
Fuller, F. G.	Hopedale
Fuller, W. J.	London
Gilmour, S. J.	Picton
Hackborn, H.	Brantford
Hadlow, F.	London
Hart, G. W.	Woodstock
Heritage, J. B.	London West
Hill, T. H.	London
Husband, E. M.	Delaware
Johnston, H. C.	London
Kerr, W. J.	Ottawa
Lamb, Geo.	St. Marys
Lawson, John	Tamblings
Lawson, J. A.	Tamblings
Leslie, Jas.	St. Thomas
MacLennan, A. H.	Guelph
McCredie, E.	St. Thomas
McInnis, A.	London
McLeish, Dan	Byron
Myers, C. E.	State College, Pa.
Moulton, John	London East
Newsome, H.	St. Thomas
Newton, T. A.	Woodstock
Poad, G. H.	The Gore
Reeves, F. F.	Humber Bay
Ridler, Jos.	Crumlin
Robb, W. J.	St. Thomas
Rush, J. W.	Humber Bay
Saunderson, N.	Byron
Sharman, Thos.	Byron
Shore, H.	Byron
Smith, F.	Byron
Smith, Geo. L.	London
Stein, H. B.	Berlin
Trott, W. R.	London West
Walterworth, Isaac	Glencoe
Welding, E. D.	St. Thomas
Whitehall, Frank	London West
Wilson, J. Lockie	Toronto

THIRD ANNUAL REPORT

OF THE

ONTARIO

Corn Growers' Association

1910

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the honour to present the Annual Report of the Ontario Corn Growers' Association.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

DEPARTMENT OF AGRICULTURE,

Toronto, 1911.

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Second Vice-President ..... J. B. Rhodes, Chatham.
Secretary ..... J. C. Steckley, Essex.
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Wm. Ford, Corinth.
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Joel Whitney, Essex.

TREASURER'S REPORT.

Report of Treasurer for year ending Feb. 5, 1911.

Receipts.		Expenditures.	
Balance on hand	$19 33	Prizes	$846 50
Legislative grant	500 00	Printing	289 28
Essex County grant	200 00	R. R. fare, hotel bills, etc.	269 21
Kent County grant	200 00	Judges, speakers, music, etc.	169 00
Municipal grants	464 00	Advertising, canvassing, etc.	94 00
Donations	369 00	Stenographer	75 00
City of Chatham	250 00	Express	48 23
Advertising in Prize List	150 00	Prize money for Corn Shows at Public Schools	74 00
Space in Show Room	40 00	Incidentals, postage, etc.	147 38
Corn sold	30 50	Draying	5 00
Membership fees	283 00	Salaries	125 00
Interest	21 70	Fire insurance	40 00
Incidentals	23 40	Decorations	40 04
		Corn Purchased	11 25
		Building for exhibition, fuel, light, shelving, etc.	250 00
		Balance on hand	67 04
Total	$2550 93		$2,550 93

Examined and found correct,

B. A. Smith,
Auditor.

J. H. Coatsworth,
Treasurer.

Ontario Corn Growers' Association.

ANNUAL CONVENTION.

The third annual convention of the Ontario Corn Growers' Association was held in Chatham on January 31st to February 3rd, 1911.

CHAIRMAN'S ADDRESS.

GEORGE W. SULMAN, M.P.P., CHATHAM.

I feel quite honored in having the privilege of being Chairman of a gathering of this kind, under the auspices of the Ontario Corn Growers' Association. They must certainly feel overjoyed to-night to realize that they have such a large and intelligent audience, and to feel that they have such an exhibition of corn as is in the other end of the Armories. I am satisfied from what I know, and from what you know yourselves, that there are no other two counties, except Essex and Kent, or no other section of the province of Ontario or the Dominion of Canada, that can give such a display of corn as we have in these Armories to-night. The local committees are to be congratulated upon the manner in which they have allotted and arranged the exhibition. I am sure that everybody engaged with the Corn Growers' Association are more than delighted at the success that has attended their efforts here this week. A great deal of the success of this Association, is due, I believe, to the efforts and work put forth by Professor McKenney, of the Essex Agricultural School. While I think that the Ontario Government have done many wise things during their term of office, still I think there is no act that they have done that is of as great benefit to the people of the Province of Ontario, as the starting of this system of Agricultural Classes in the Province of Ontario, and one of the most suocessful that we have is the one that is close to us, the one at Essex. I hope to see the time when we will have one established in the County of Kent. It is the intention of the Government to establish five more of these schools this year, and I hope that the County Council and all the different municipal bodies in our county will join together with me, and we will try and impress upon the Government the importance of Kent County, and we will try and have a school here this year if possible. The Minister of Agriculture has stated that it is his intention to extend this system until we have a representative in every county in the Province of Ontario. A county having such a rich land, and being one of the largest, it is very desirable that they start here as soon as possible, and for that reason, I want your co-operation and support to asssist us in trying to get that school here as soon as we can.

ADDRESS OF WELCOME.

ROBERT L. BRACKIN, MAYOR OF CHATHAM.

After giving a cordial welcome to the visitors, and expressing the desire of the Council to double the appropriation to entertain them again next year, the Mayor proceeded to say: Chatham lies in the centre of the greatest corn producing district in Canada, and that is another reason why you should come back to this city. We have a fine agricultural county, and Chatham is interested in agri-

culture as perhaps few cities are. A very significant thing was drawn to my attention the other day, and that is that there has come into the counties of Essex and Kent a couple of large corporations who deal in farm land, and who are prepared to spend millions of dollars in buying farms in the counties of Essex and Kent, for the purpose of bringing farmers over here from Indiana and Illinois, so that the American farmers can settle here amongst us and become good Canadian citizens. That is a tribute to the quality of lands which we have in the counties of Essex and Kent, when we find people willing to expend not only thousands of dollars, but millions of dollars, for the purpose of acquiring farms here in order to bring men in from the United States. For that reason also, we in Chatham are interested in corn growing; and that is an additional reason why we should have the pleasure of welcoming back the Corn Growers' Association upon another occasion. We will not concede for an instant that our interest so far as this matter is concerned is confined to Essex and Kent and adjoining counties. This movement goes farther, and affects the whole Dominion of Canada. When we have something which affects the welfare of the whole Dominion, then we have something in which we are all interested, and which we should all do our best to promote, and which we should all do our utmost to make a success.

We are proud of our city and proud of our county in which we live, and we ought to be prouder still of our Dominion as a whole. It is very gratifying indeed, for you to know as farmers, that the people are coming into the Dominion of Canada for the purpose of taking up our farm land by the hundreds and thousands. This year we had upwards of four hundred thousand of Americans come into the Dominion of Canada, most of them for the purpose of taking up farm land, and we ought to do all in our power, not only to demonstrate to other parts of the Dominion of Canada what fertile lands we have down here in the southwestern part of the Province of Ontario, but we should also seek to demonstrate it to our neighbors to the south, and to the people of foreign lands, that they may continue to come in here, and build up the Dominion of Canada, and to make it what we claim it now is, and what it will be in the future—the greatest colony in the British Empire.

We are glad that this Corn Exhibition is a success, because it tends to promote the welfare of the agricultural community in the Dominion of Canada. If you think there is anything which Chatham can do within the next few days to assist you in making this Exhibition an even greater success, I hope those who are in charge will not fail to come to us and tell us so, and if there is anything in reason we can do, we will only be too happy to do it.

THE FARMER AND THE FARMER'S SON.

DR. G. C. CREELMAN, PRESIDENT O. A. C., GUELPH.

I appreciate the invitation I received to come from the city of Guelph, and represent the Ontario Agricultural College at this Corn Show, and to be permitted to say some things on the subject of agricultural education to the people of the counties of Essex, Kent, and Lambton. These three counties have become known as the corn counties, more especially Essex and Kent. It was therefore with a good deal of pleasure that I accepted the invitation to come to you to say some things on a subject that is very close to me and very dear to my heart, in fact it is

about the only subject that I know anything about. Agriculture is a subject in which I have been interested, and a business in which I have been engaged, ever since I was born.

I was born and brought up on a farm; graduated twenty-three years ago from the Agricultural College at Guelph, and have been trying in my feeble way ever since to disseminate some of the knowledge which I gleaned there. I am pleased to be able to come to this show and address this large and intelligent audience, and to be able to say some things to you along the line of agricultural education.

The Agricultural College. We have at the Ontario Agricultural College at present about one thousand students in all classes, trying to get inspiration, information, and knowledge that will enable them, when they return home, to be more useful citizens and to be larger and better producers of farm products on their own farms. We have, at the present time, besides the regular students in the agricultural classes, one hundred and fifty girls taking domestic science, cooking, sewing, and laundry work. We have a course in packing apples in boxes, a new industry in this Province, and in order to get the very best instruction on the continent, we brought a man all the way from Hood River, Oregon, to give our young men special instruction so that we may be able to compete with anybody, and more particularly our neighbors on the western coast who have been putting up their apples and oranges in such attractive form; they come into our Ontario cities, and we buy them because they are put up in such excellent shape. We have a large class also in which there are two hundred studying live stock judging, some boys and their fathers. Knowing that eighty per cent. of all the farm crops of the Province is fed to live stock, these men realize that if they work hard to produce good feed, and then feed it to an inferior animal, they are losing a good deal of the brawn they put into their work in the summer season, with the result that they are endeavoring to get the very best instruction now that will enable them to feed their herds and flocks in such a way that will give them the very best returns for the amount expended in feed, and the time put upon them in the stables, and in the barns. Most of these students are from the farms of the Province of Ontario, and it may interest you to know that in addition we have at the Agricultural College, students from all over the world—from Australia, New Zealand, Japan, India, and also at the present time we have twelve students from South Africa, and students from England, Ireland, and Scotland, from the Argentine Republic, from Spain and Mexico, from ten states of the American Union, besides from every province of the Dominion of Canada. That speaks well for the institution over which I have the privilege to preside, but for which I take no credit whatever. It is an institution supported by the Ontario Government, and liberally so, and it is patronized by the farmers of this Province of Ontario. Without the money from the Ontario Legislature, we could not go on, and without the boys from the Ontario farms we could not go on. I am pleased to say to you that we have an excellent staff of men, mostly farmers' sons, who have graduated from our College, or some similar institution, and are now upon the staff to give instructions to your boys and girls. I make this explanation as President of the Agricultural College because the institution is yours, and I am simply your servant managing it for you, and if it is not managed to your satisfaction it is your privilege to tell us how to manage it better. You are rather far away from us to come as regularly as we would like to see you, but every year during the month of June, when we have from thirty to forty thousand farmers come to visit us and talk to us, and let us talk to them, we get a good deal of information that is useful to us, and we

believe the farmers get a good deal of instruction from us; and again, at the time of the fat stock show in December, when your people come to us, we get suggestions with regard to the raising of live stock that are useful to us in our business, so that we get more or less closely together, twice a year, and it is only fair that I should return the visit which you pay me in June and in December.

Farming. Every farmer who works is more independent than anybody else that works in this country that I know of. Every farmer that works may be healthy and happy and raise just as large a family as he likes, without fear of starvation or criticism. Every farmer who works may have days and hours and even weeks of leisure, if his work is well planned, and on every farm of this Province there are times between haying and harvesting, and between seeding and haying, that you may leave the farm without very much detriment to it. If the farmer would take his wife and go off for a trip, and give his boys a chance to run things for a while, and get ideas that would be helpful to them, it would give the boys a higher appreciation of the life which they are living.

In the last place, I would say that every farmer who works—and I could not have said this twenty years ago—has now a full and clear scope on the ordinary Ontario farm, for the exercise of just as big brains as may be found working in any other business. I think I have qualified my first remark that farming was not a money making business, for some do get rich. But even if the average man who works according to his intelligence does not get very rich upon the farm, and is not able to own an automobile and go travelling in it every day, and is not able to keep a yacht, or a fast driving horse for driving only; yet he may, and he does have, if he is a good farmer, a healthy life and leisure and scope for his brains and happiness, and that is worth all the money in the world. This looks like an attractive programme for the farmer, and I want to be perfectly frank with you, and I want you to think over what I am saying. Why in the world, in Ontario, and in Quebec, and in the eastern provinces generally, in the western provinces, and in the United States, and all over Europe, are the young men leaving the farm, and the old ones, too, and going into crowded conditions in the cities? You hardly pick up a paper, whether it is a city daily, an agricultural paper, or a metropolitan weekly, they are all asking the question why it is the boys leave the farm, and it is a question that is hard to answer, and cannot be answered in one sentence. There are lots of reasons why the farmer's boys leave the farm, and I am going to try and point out some of the things, which from my observations have come to my notice, and which may have some bearing upon the question. In the first place, the old man is always talking about leaving the farm when he gets enough money and often does, and he would like the boys to stay, and yet there is hardly a day goes by that he does not grumble about living on the farm, and he envies the man who lives some place else. All that has a tendency to make the boys leave the farm. In old England, especially, if you talk with the merchant who handles our butter and cheese, they will tell you their ambition and hope is to have enough money in the city to some day retire to the farm and live in a country place, estates they call them there. As I talk to our farmers in the counties of Essex and Kent and Lincoln and York and Hastings, and all the way down to Glengarry and back up to Ottawa, their ambition is to save enough money so that at three per cent. they may have an income of five or six hundred dollars a year to live on in the city in perfect peace and prosperity all their lives. Perhaps these are some of the reasons why there is a discrepancy between the city and the farm.

May I be excused for saying that it is my privilege to visit the country places, and I have been privileged to speak to some of the Canadian Clubs with regard to

their attitude to the farming population immediately surrounding the towns, and I think that the townspeople have a responsibility they have not always risen to. The farmer is directly interested in the city factory, and I find in these towns some retired farmers, and if I raise the question I am apt to get myself disliked by them; but I am going to say something now which I believe is absolutely correct, and I will take chances on the retired farmers, or those who hope to retire, disagreeing. May I preface my remarks by saying that, compared with the man in this Province of Ontario who has lived upon an ordinary farm, and raised a family, there is no man to my mind who has a better right, at fifty-five or sixty years of age to retire quietly somewhere, and pass the rest of his life in ease and comfort. Every man is a pioneer who goes upon the farm, and starting on it, brings it up from being worth twenty-five dollars an acre, to one hundred dollars, and I say that man has a right to retire anywhere he likes, and if he retires to the city or town, it is nobody's business. But what I am making a plea for is that that man will stop to think as to whether when he goes into the town in which he is not personally interested, and has only a short life before him, with a small amount of money, is he making a move toward perfect happiness? Would not that man be better off if he were to take a corner of the old farm, build a cottage for himself, and a little stable, and keep one good horse, and a good cutter and buggy, and call his time his own, and help the boy in the harvest season, help the boy whenever he needs him most, and stop when he feels like it? He would be an honored member of the community in which he was brought up, and he would be at leisure to be elected school trustee, or road master, or to the county council, or township council, or a member of the Legislature, and with all the experience he has had on the farm he would be of value to his own neighborhood. He can improve the school, and read his agricultural papers in his old age, help his own boys along, and his neighbors' boys, and all the time he would be living in the community where his family was raised, and among his own people. I think that would be better than going to the city, and getting the scorn of city people. The farming people and the city people judge one another by different standards. The farmer has been used to looking upon the man in the city or town—such a man as the mayor who has addressed you, or the chairman, or those business men who go about well dressed and with creases in their trousers—the farmers think they are dudes. Then the mayor or the chairman goes out into the country, and he sees the farmer dressed in his overalls, and with an old slouch hat on, and he says, "That man is a hayseed." Each of these men may be perfectly well dressed for his business, but each one thinks the other is extreme in style. Sometimes when the farmer is busiest his relatives or friends come out to visit him, and they have nothing to do, because they are having a couple of weeks vacation. They come out into the country, and bring their family, and they are better dressed than usual, they have their Sunday clothes on, while the farmer is working for a living by the sweat of his brow, and he has to stop and hitch up his team and go to the station and meet them, and then put up his team, and sit around asking how they are getting on, until dinner time, and maybe he loses half a day, and then he has to hustle through dinner and leave them sitting on the verandah while he goes out and does his work, and the city man sitting on the verandah says, "I would not work the way they have to here if I never got any work done." The country man says, "I wish I had nothing to do like brother Jim; he has nothing to do but bring his family out to the country and sit around. He must be very rich." Comparisons are odious, and there are false standards set up by both parties which are not true in either case. When I go into the city of Toronto, or Ottawa, or

Montreal, and if I meet a man who knows me, he may say, "Creelman, will you come and have lunch," and he may take me to lunch, and then he goes back to his office, and I go home, and that man has done all he thought he should do in the way of hospitality, and probably more than I ought to expect. He does not invite me to his home. He may not have enough eggs to go around, and he may get his milk a pint at a time, and he has not got a cellar full of potatoes, or a crock of butter, and he would not like to divide his strictly fresh eggs, even if he had any, with a sick friend. That man goes out in the country, and if he passes my farm, and his horse has not got enough sense to turn in, I am put out about it, and the next time I see him, I say, "Why did you not come in and stay and have dinner?" He says, "I do not like to intrude," but I tell him we have plenty to eat in the house and to put up his horse and give him lots of oats and hay, and stay for dinner and supper. We give him the best we have, and yet the town people will say the farmer is a mean man, and all that is the matter is that the town man has got cash in his pocket and expects to spend a dollar or two on luncheon or drinks and he buys anything he likes, but he does not take you home. The farmer has not got much in his pocket, but he has lots of stuff in the house to eat, and when you see a man well dressed up at work, it looks as if that man makes his money quite easily. In other words the farmer thinks that the man with the good clothes on does no work, and that he is perfectly free from care and has all the money he can possibly spend; but I want to say to you that in these days of high cost of living the farmer is getting prices that justifies him in going on with his business.

Sometimes young men who went to school with me in the old town of Collingwood, but who are now living in Toronto, come to me and say, "Creelman, you were wise to stick to the farm work. You do not know how hard it is to make ends meet in the city. I get seventy-five dollars a month in the city, and it is hard to make a living." One young man said to me, "I have a wife and three children; milk is ten cents a quart, and my children are not getting all the milk they ought to have, nor the eggs they ought to have, nor the fresh farm produce. We have to stop and think about what we will have for the next meal, or how much we are going to make over for the next meal." He said to me, "If I had an opportunity to change conditions, I would return to the farm."

I think the unattractiveness of the ordinary farm home has a good deal to do in keeping the boy away. I would not have all the boys stay on the farm. If they did, what would we do for our lawyers and doctors, I mean the real lawyers and doctors and preachers, and dentists, and other classes of professional men, who are doing good work, and who are doing it so well that when they go to the United States we hear of them at the head of their professions? Our best professional men come from the strong, hardy manhood of the farms of Ontario. I would not have all the farmers' sons stay on the farm any more than I would have all the sons of doctors become doctors. There are lots of boys who will naturally go into some other other profession. We do not want them all back on the farm. There are some boys who start as young farmers, and they start to school, and when school hours are over they feed the stock and weed and hoe. They love the stock better than they love anything else. You give them a colt and they watch it come up until it gets to be a horse and they can drive it and they will say, "I know this is going to be a good horse," and when they get to be sixteen or seventeen they are perfectly satisfied and sleep two or three in the bed and do not complain about being crowded in the ordinary farm house, and they get up early in the morning and light the wood fire and do their chores and go to bed at night, and when such a lad gets to be seventeen years of age, and his father is forty or fifty, and has got a little

rheumatism and is crippled up from working too hard, and has lost interest in things and grumbles, then that boy has got to be managed very carefully or he is going to get tired of the farm and you cannot blame him for it. If he goes to the city he may have to live in a second-class boarding house, and pay four or five dollars a week for the privilege of living in a back bedroom and eat canned food, and work in a departmental store to make a living, but he has got the privilege at night of going into the parks in the summer time or over to the island, and he has certain hours of the day that are absolutely his, which he never had on the old farm as long as there was any daylight to work by. He will say to himself, "This is pretty tough living, but I don't want to go home, because there is not much to go home for. If I had an understanding that I was to get ten dollars a month and my board, and if father would not say, 'What did you do with the ten dollars I gave you last year?' or if the colt he gave me when it was young, he did not take back when it got old and say it was father's again, I would be satisfied." He may even give the boy a colt, and he will break it and drive it once or twice, and as soon as it is fit for work it is the boy's no longer, and the same way the boy gets the gift of a calf and the boy dreams about it at night and feeds it up and gets it in fine shape, but the first time it goes to the Fall Fair somebody offers father a price for it and it is the boy's no longer. That happens all over this Province of ours, and that kind of thing will not keep the boy back from the city. I have a boy at the College now who came to me and said, "I want to have a talk with you. You are a young man and you have been good to me since I have been here, and I think you understand the ideals of young men. My father and I do not agree. I had to run away to come up here. I have been working for my father and I am twenty. My father fed me until I was twelve in the hope that I would be some use to him when I got older. I did not see any more chance to get away ten years from now than now; because father was getting used to the idea that I am going to live and be a boy all the time. I am here now and I have got twenty-five or thirty dollars that I worked out for, and I think father will come around with the balance when he sees I am in earnest about an education, but I hate to force his hand. Can you help me?" It has often been my privilege to talk to such a young man and tell him to write to his father and say to him, "The time has come when if you cannot help me someone else has got to, and if I do not get more education now I will never get it. I have worked on the farm and I can do things as well as anybody else in the neighborhood, but I do not know why I am doing these things and the old farm is no better than when I started on it ten or fifteen years ago. I know nothing about the value of commercial fertilizers or barnyard manure and why clover is planted." I know of many instances where the farmer encourages one boy to go into medicine or law and the mother will work her finger nails to the bone to assist him to go into a profession, but when John comes along and says, "I would like one hundred and fifty dollars to go to the Agricultural College," the farmer shakes his head and says, "I don't know whether it is worth it or not," and that is one reason why the boy says to himself, "I don't know whether I want to be a farmer or not."

There is a good deal of monotony in living on the farm. You cannot be working a hundred acre farm and be going to dances at night and doing your work in the day time, and go to tea parties in the school house and go to horse races and Fall Fairs and get your work done at the same time, but I think that there is a happy medium. The farmer will take his boy into town and let him wander around in the town until the old man gets through shopping or a horse trade or through his banking, and then he takes the boy home and thinks he has had a

holiday, but that does not work with the average boy. If the farmer would bring his boy to corn shows like this; even if he had to take him out of school and pay his board at a good hotel or boarding house, and keep him here and let him talk to Mr. McKenney or Mr. Duke or other good farmers, and let him look at the corn, it would be a great deal better than looking into the store windows or wandering about town; and instead of taking your boy to the Fall Fair and letting him loose upon the grounds with ten cents in his pockets to buy peanuts, it would be far better to let him go with you and get some interest in live stock. If we would take our boys into our confidence at an earlier age and bring them out to these fall fairs and let them have an opportunity of seeing the important farm products that are shown at these fairs it would be a great deal better.

In the last place I want to say to you that the greatest need, not only in the counties of Essex and Kent, but all the other counties, at the present time is co-operation in marketing more than anything else. I say that advisedly. I got this illustration from Secretary Wilson of the United States. He says he found in California, where they grow such large quantities of oranges and wrap them carefully in paper, where the farmer did his share of the business right in every detail, that when the oranges got into the hands of the people of the eastern part of the United States and in Canada that the farmer only got 20 per cent of the price the consumers paid. That is not fair, and is not enough. I have no quarrel with the middleman, because we have not organized sufficiently to do without him. I can see it growing here in the compliment these farmers have paid you in coming to the City of Chatham, and in showing you these splendid ears of corn, the best I have ever seen, and the best Corn Exhibition ever held in the Dominion of Canada. I say these farmers owe it to themselves to get a more complete organization, and we hope that through the help of Mr. McKenney and other men, who will use good judgment and common sense, you will get an organization that will enable you to market all the farm products of this part of the country so that a larger part of the money will come into the hands of the farmer than has been coming to him in the days gone by.

I would like to have said something about how these agricultural representatives are working who are being established here and throughout the Province, and I would like to tell you that Sir James Whitney himself, our Premier, is especially interested in this work and backing up the Minister of Agriculture and other Cabinet Ministers who are giving it their personal attention. They have already established fifteen offices, and the estimates that have been brought down call for five more of these men to be placed in different parts of the Province during the coming year. I trust that the County Council, having seen some of the effects of the work of Mr. McKenney in Essex, will leave no stone unturned through their local member and the Boards of Trade and Farmers' Clubs towards getting a representative for the County of Kent.

What I have said has been largely, not in the shape of criticism, but to help the growing boy, our own boys upon the farm, and now I want to tell you something about the boy in the school and the attention he is getting with the object of keeping him upon the farm and making him a good farmer. We tried some time ago to get agriculture taught in the public schools. We had no difficulty in getting the school Inspector to say, "Yes, this is a good thing. The boys in rural schools ought to have some instruction in the business in which they are going to be engaged." We had a text book written by Dr. Mills and Professor Shaw, and we introduced it, and it was a failure. Then Professor James, the Deputy Minister of Agriculture, was instructed to write a book. It was simple, easy, and correct.

and in every way fitted for the work. It was put into the hands of the teachers and it failed. We did not know what to do, and all at once discovered that we had been working at the wrong end of the question, because we had been asking young girls from the Model Schools to come into the country school and teach arithmetic, geography and history and grammar and all other subjects of the curriculum, and then we put into their hands a book on agriculture—girls who had never been on a farm—and we asked them to take the large boys and give them lessons in agriculture. The thing was perfectly ridiculous and not fair to the teachers, and failed. We have now, through the co-operation of the Minister of Agriculture and the Minister of Education, during the months of April, May and June, school teachers from the Normal Schools come to us, and we take them over the farm and teach them to make a garden and look after things in the garden, and what weeds are, and the different kinds of farm crops; and when they go back to the school they can teach the children the common insects and the common weeds, and the boys and girls at the school can get a good start. I believe the farmer boy ought to be given an opportunity of getting just as much agricultural education as possible. I think if the boy knew all the common insects and weeds and weed seeds, and how to grow alfalfa, and knew the different kinds of corn and how to judge corn, and if we could spread that work all over the Province, the cry would soon go up that the farmer boy was getting all that he was entitled to.

We hope this good work will go on, and I trust that if there is a trustee of a rural school here to-night, and if he has a teacher that has got into this work and is teaching these subjects, he will not allow some other school section to take her away, because they offer her a little more money.

CORN CULTIVATION.

L. S. Klinck, Macdonald College, Que.

For the past two days we have been paying special attention to seed corn. Methods of selecting, storing and testing have been discussed, and considerable time has been devoted to the judging of commercial samples. These, however, are but a few phases of the many-sided problem of successful corn production. Those having the management of this convention have shown their appreciation of this fact by setting aside this session for the discussion of the problems of corn growing from the field standpoint, and have requested that special attention be given to rotation, cultivation and the choice and management of lands intended for corn.

Successful corn growing requires strict attention to the three essential factors in the profitable production of any cultivated crop—strong, vital seed of varieties well adapted to the locality, thoroughly prepared and well cultivated land and a suitable rotation of crops. Some lay emphasis on the seed only, but such cannot be regarded as successful corn growers. Emphasis must be placed all along the line—on the seed, the soil, the rotation and on the cultivation and general management of the land and the crop.

Prof. Day has shown the effectiveness of tile drainage in controlling our rainfall. To this extent at least we have control over our climate, and from what we have heard to-day from our drainage expert, confirming, as it does, our own conclusions, based on observations, we all readily acknowledge that drainage is one of the most important factors in soil management. By lengthening the growing

season, drainage will contribute much to the solving of the problem of early maturity and will add very materially to the acreage of our corn lands.

With regard to the choice of soil for corn, much of your low lying land, when drained and cultivated, is admirably adapted for the production of this crop. In other districts, where corn is grown more especially for the silo, one will naturally choose from his hoed crop section the earliest and warmest soil for the growing of his corn and put his roots on the heavier soils. The corn being a semi-tropical plant requires a warm soil, so that it may get an early start. Our season at the best is short and every day counts; therefore, a warm, well-drained soil is best adapted for the production of this crop.

Corn is a gross feeder, but in competition with weeds and with poor cultivation cannot be classed as a strong forager. No agricultural plant will respond more readily to generous treatment, and no plant will better repay the farmer for forethought as to preceding crops and their order in the rotation. If its habits are studied and its whims and preferences catered to, it will respond with a generous yield even in a district where the growing season is short.

While we may not all have gotten down to the three or four year rotation, we all know that certain crops do better after other crops than by following themselves, or crops similar to them. On this continent the University of Illinois has the most valuale work with regard to the rotation of corn. There they have grown corn after corn ever since 1879 on the same plots. At the outset these plots were yielding an average of 70 bushels of corn to the acre. The land was rich and well suited to the crop, but after corn had followed corn on the same land for thirteen years the yield was reduced to 35 bushels per acre, and after twenty-nine years it had fallen to 27 bushels per acre. Where a rotation of corn and oats was followed the yield dropped to 62 bushels at the end of thirteen years, and to 46 bushels at the end of the twenty-nine-year period, while a rotation of corn, oats and clover dropped to 66 and 58 bushels, respectively, for the same period. These figures, obtained in the heart of the "Corn Belt," emphasize the necessity of following a good rotation if corn is to be produced profitably.

We are interested in growing crops in rotation in order that our crops may have the best possible chance to give us profitable returns. Most growers aim to have corn follow clover in the rotation. Clover adds to the nitrogen content of the soil, draws the mineral elements required for its growth from great depths, and, in decaying, leaves those elements near the surface, where they may readily be taken up by the corn plant. Its deep feeding roots open up the sub-soil, so that the water and air can readily enter. When the clover sod is turned under the roots add humus to the soil, and, in decaying, bring about that warm, mellow, physical condition in which the roots of the corn plant delight. The corn roots follow in the channels formed by the decaying clover roots, and thus are enabled to develop a vigorous and extended root system early in the season.

Late summer or early fall is the best time to begin the preparation of land for next season's crops. Especially is this the case where couch or other troublesome grasses or weeds are present. Those can be much more successfully combatted in a field in which there is no crop than in a field of corn. Therefore, as soon as the clover hay is off, the sod is plowed and cultivation is begun to rid the land of grass and weeds.

For the first plowing it is not wise to go deeper than three or four inches The sod should be turned flat and the furrow cut as widely as possible. In the afternoon run a heavy roller over the part of the field turned that day. This presses the furrow slices down flat and solid so that the harrows will not tear up

the sod. Rolling also aids in re-establishing capillarity, and this moisture, in the absence of a free circulation of air, hastens the decay of the sod. In a few days the light drag harrows may be run over this rolled ground, but always in the direction in which the land was plowed. The harrows, if sharp, will cut the earth from the roots without tearing up the sod, and by filling up all the spaces between the inverted furrow-slices, will smother out the clover and timothy completely. It is good practice when harrowing the sod to give the harrows a half lap each time as this is much more effective than harrowing twice in the same direction. In the course of a week or ten days the field may safely be harrowed, cater-cornered, or even at right angles to the plowing without tearing up the sod, and a few days later the spring tooth cultivator may be used to advantage. This cultivator will work the earth away from the roots rapidly, and will also destroy any small weeds which may have started. After one or two cultivations with the narrow points, should any grass or weeds appear, the narrow points are removed and the broad ones are attached to the same teeth. As former cultivations have formed an inch or two of free-working surface soil, the broad points do splendid service in cutting off all new growth.

If the field is fairly clean this is all the cultivation it will require that fall and manure may be applied at once, or during the winter; but should the field be overrun with couch grass or with brome grass, further surface cultivation and an additional plowing is usually given. The cultivations outlined above will require a month or six weeks depending upon the weather. If the work has been thoroughly done, and if the season has been favorable, all the roots in the first three inches of earth will have been killed by this time. If it has not been favorable, it is better to leave the field alone, as it is practically impossible to fight these grasses successfully in a wet summer, and, in adition, one runs a great risk of seriously injuring the physical condition of the soil.

In couch-infested land, about six weeks after the first plowing, plow again. By plowing about six inches deep the dead roots on top will be buried and some fresh ones will be brought to the surface. As couch grass is a shallow feeder, a six-inch furrow will usually reach all the roots. After this plowing, roll, harrow and cultivate as before, the aim being not to break up the roots, but to work them to the surface where they will be more readily killed by the sun. When these grasses are present eternal stirring is the price of victory.

As soon as the roots brought up by the second plowing are killed, manure may be applied at once. Should the field be rolling, or hilly, a common practice is to manure this part late in the fall, and then rib it up into narrow drills with a double mould board plow just before the ground freezes. These drills are made as high and narrow as practicable, so as to expose the greatest surface possible to the pulverizing action of frost. In land infected with couch or brome grass this method is very effective in freezing out all the short pieces of roots which, because of their shortness, could not readily be worked to the surface by the harrows or cultivator. While this method exposes a great surface to the action of frost, the fact that all manure is inside the drills renders leaching or washing almost impossible.

In districts where the land is light and the season fairly long, a common practice is to allow the land intended for corn to remain in clover until a week or ten days before planting time. This is good practice under the conditions mentioned above, as it allows the clover to add more nitrogen and increases the amount of green manure to be turned under, but on grassy farms, and in districts where corn needs every available day to mature, the system is open to serious objections.

At Ste. Anne, our season is shorter than yours, and we have been caught twice where we were trying this plan on a part of our acreage. We got the growth of clover all right, but the trouble was a prolonged wet spell set in just when our clover should have been plowed under, and this, coupled with the fact that our heavy land dries slowly, made it impossible for us to get our corn in as early as we should have liked. While the clover thus turned under has a high manurial value, and while it undoubtedly helps to warm up the soil as soon as decomposition sets in, still this process is not rapid during the latter part of May and early June. A large amount of plant food has been added in the clover, but the greater part of this is not readily available for the corn's use until much later in the season when summer cultivation and more active bacterial action have liberated the plant food. This accounts for the fact that where corn is planted on a spring-plowed clover sod the growth is less rapid in early summer than on manured fall-plowed land, and also why corn on such land often fails to harden up in the fall.

For the main crop, it is never good practice to push the season. If the ground is cold, occasional discings will aid greatly in warming it, but it always pays well to wait until the ground is thoroughly warmed before planting.

Plant five kernels to the hill. Even when each individual ear has been tested for germinability and has been found good, the possibilities of unfavorable soil and seasonal conditions, coupled with the injury done by insects and the inevitable loss occasioned in cultivations, all emphasize the necessity of planting five kernels to the hill if a full stand at husking time is to be expected. Should the stand prove too thick when the corn is fourteen to eighteen inches high it can be readily thinned by hand with but little extra labor, and when forage is scarce the thinned plants may be used to good advantage for soiling. The largest yields of corn of good quality are obtained when the corn is planted in hills three feet six inches apart each way. This is a convenient distance for cultivating, and insures early maturing ears of good quality on sturdy, well-developed stalks. Three stalks to a hill is considered a perfect stand. On warm, loamy soils corn may safely be planted at a greater depth than on heavy clay soils with a cold, stiff sub-soil. When moisture is abundant, best results will generally be obtained on heavy soils if the seed is covered from one inch to an inch and a half deep; on light, loamy clays, or sandy soils, the seed will germinate more uniformly if planted about two inches deep.

If the soil is dry at the time of planting, it is good practice to roll the field as soon as the planting is completed. The roller firms the soil particles around each seed, and by bringing the soil in close contact with each kernel hastens germination. If the loss of soil moisture by evaporation from the firm, smooth surface left by the roller threatens to draw too heavily upon the reserve supply, a stroke with the harrow will, by disarranging the soil particles at the surface, destroy the capillary tubes, and the thin dust blanket formed will tend to check too rapid evaporation.

Successful growers begin to cultivate before the corn is up. If weather conditions have not been all that could be desired, countless weeds will have germinated before the corn, and these will cause serious trouble if not destroyed while small. For this purpose the weeder has proven itself a most valuable implement in the early cultivation of corn, as it is sufficiently heavy to destroy all small weeds, and, at the same time, light enough to do but little injury to the corn from the time of germination until eight inches high. If a weeder is not available an ordinary light drag harrow, with the teeth tilted backward, will be equally effective. Of course, some corn will be destroyed in those cultivations, but the loss in value of

extra seed is insignificant, and is far more than compensated for in the fewer weeds, in the conserved moisture and in the aeration of the soil if a heavy dash of rain has compacted the surface.

Although the use of the weeder is continued until the corn is from six to eight inches high, the ordinary two-row cultivator is started just as soon as the rows are clearly visible. The first cultivations are always deep and wide. A leveller attached to the rear of the cultivator, so as to smooth down the ridges left by the claws, is a valuable addition to any corn plow. This leveller not only makes conditions unfavorable for rapid evaporation by lessening the surface area exposed to the sun and wind, but also tends to pull to the surface any weeds which may have been cut off and left partly buried.

The most successful growers do not stop cultivating when all weeds have been destroyed. When the use of the two-horse cultivator is no longer practicable, the one-horse cultivator can be used to splendid advantage. Corn requires an immense amount of water at all stages of its growth, and just at the time when it is making its heaviest demands upon the soil many farmers stop cultivating, because they break down too much corn with the two-row cultivator. Now, what happens when cultivation ceases at this stage of the plant's development? If a heavy dash of rain comes and firms the soil, the ground, if heavy, will bake and crack, and in so doing will break many of the feeding roots and will expose others to such a free circulation of warm air as seriously to impair their usefulness. In this compacted soil the capillary tubes, not being broken or covered with a blanket of fine earth, rapidly carry the water to the surface, where it passes off into the air, whereas, if it could not have escaped by this means, it would have been taken up by the roots and have served as a vehicle for carrying food from the soil to the plant. After soil has once been compacted through heavy rains and lack of cultivation, it not only fails to utilize to the full what moisture it has, but later rains drain away over the hard surface and are lost; whereas, if a good mulch is retained, it not only acts as a sponge, so far as its water holding capacity is concerned, but it makes conditions favorable for the lower layers of soil to absorb and retain that large quantity of water which is so essential to the production of large yields of corn.

The strawberry cultivator is used in the final cultivations when all weeds have been destroyed, and when the only object in stirring the soil is to maintain a dust mulch. In wet or backward seasons this implement is rarely used, as the aim then is to check excessive growth of stem and leaf and induce the plant to devote its energies to the producing and maturing of ears.

A fundamental principle to be observed in cultivating corn is to cultivate as deep as possible during the first month of the young plant's life, and gradually decrease the depth until the last cultivations do not exceed an inch and a half. By this method conditions are made most favorable for liberations of the greatest amount of plant food and for the development of the most perfect root system.

TILE DRAINAGE.

W. H. Day, B.A., Professor of Physics, O.A.C., Guelph.

I am to talk to you this afternoon on the subject "Underdraining as a Factor in Corn Production." There are many phases of agriculture. In this Province there is the stock industry, the ordinary grain industry, the fruit industry, and the

corn industry. Be that industry what it may, every one of them springs from the soil. The soil, as your Chairman has said, is the foundation of all those industries, and in order that the soil may bring forth the crops when it should it must be in a proper condition.

Of all the agencies that work toward this condition there is perhaps none more important than underdrainage. Underdrainage does two great things necessary in crop production. In the first place it rids the soil of the excess of moisture, and in the second place it saves up the supply and keeps more water in the soil later on in the season when it is needed, contradictory as that may seem.

At the outset I want to examine for a short time just a few ways in which underdrainage improves the condition of the soil. In the first place, as I have said before, underdraining rids the soil of its excess of moisture, and as a result the soil can be sown or planted earlier in the season. I have no doubt there are many here this afternoon who remember very well what it meant last spring when the rains came on and the seed time was thrown back three or four weeks. It is a matter of experience, and we have reports from farmers to bear out the contention that underdrainage brings the seed time ahead, from three to four weeks. I venture to say that the underdrained lands in these flat counties of Essex and Kent were planted three or four weeks earlier than those that were not underdrained. That in corn growing is a very important fact.

A good start is half the battle in corn growing, and underdrainage is one factor which will enable you to give the corn a good start and bring forth a bountiful harvest. And not only does it set the seed time ahead, but it makes the soil warm, and that is another very important factor, because you know the seeds cannot germinate in a soil that is cold. Underdrainage will warm up the soil from ten to fifteen degrees in the spring time. Every seed has a temperature at which it germinates best. Wheat, for instance, will germinate best at 70 degrees, oats and barley at 80 degrees, and corn at 90 degrees. That is why in corn growing we must plant late in the spring, because if we plant it too early the soil is too cold, the seed will not germinate well and the crop gets a set-back before it has reached the top of the ground. Underdrainage will warm the soil and enable a temperature of 90 degrees to be reached earlier in the season; therefore by underdraining you get a better germination, consequently a larger harvest.

Let me explain two ways in which underdrainage will warm the soil. In the first place water is harder to heat than any other substance in the soil. It is ten times as hard to heat as sand and seven times as hard to heat as ordinary soil. You can understand what it means to have twice as much water in the soil as you should have. This water that is so slow to heat keeps the soil from warming up in the spring. There is another way in which underdrainage will warm the soil. We have all noticed that on a warm day in the Summer, when the perspiration stands out on our brow and does not dry up readily we feel warm, but if we fan ourselves and cause the perspiration to evaporate we feel cool. The evaporation of that perspiration cools the body. In the same way the evaporation of the water that is in the soil cools the soil. You can prove that by taking two thermometers that read the same. Wet the bulb of one in your mouth, and that will send the mercury of that thermometer up, but lay the wet and dry bulbs of the thermometers side by side for a while and soon you will find that the wet bulb will read ten to twelve degrees lower than the dry one, and yet be in the same room. The evaporation from the wet bulb has cooled the mercury in that thermometer, and in just the same way the evaporation of the soil moisture cools the soil.

What has that to do with drainage? Soil that is drained will become dry on

the surface three or four weeks earlier in the spring than one that is not drained, and just as soon as the soil looks dry the evaporation is largely cut off. Consequently the heat from the sun that assisted in evaporating the water now warms the soil.

It would surprise you if I told you that on the 21st day of June, a dry clear day, that the evaporation of water from the surface of a wet soil uses one-half of the heat that comes from the sun. It is a most surprising thing. If that evaporation takes half the heat of the sun on the 21st of June, and if you have your soil drained and that evaporation is prevented, then of course the temperature of that soil will be warmer than the temperature of undrained soil, tests showing the difference to be from ten to fifteen degres. We have, as a result a temperature that will germinate corn better, and because it is a better start, it naturally follows that it will do better throughout the entire season.

Underdrainage makes the soil more porous. It loosens up the soil, and consequently that soil is capable of holding more water than before it was drained. A sponge will hold more water than a stone, because it is more porous. The same thing takes place when you underdrain the soil and loosen it up. The drained porous soil holds more water when the dry weather comes and gives more water to the plant; keeping the corn growing at the time of the year when on undrained soil it would be suffering for lack of moisture.

We have come to the time in the development of science when it is realized that many of the diseases that affect mankind are caused by little germs called bacteria. Many of the transformations that go on in nature are caused by these little organisms. Take an apple that is decaying: that decay is caused by bacteria. Take the manure that you put on the soil, that manure decays because of these little bacteria. These bacteria that transform the manure or soil into plant food and make it available, thrive much better in a drained soil than when it is not drained, because there is more air and warmth and heat, and hence we find that drained soil has very much more available plant food in it than undrained soil. That is a very important fact. We find that in drained soil there is more root space. In the soil that is not drained the water prevents the roots from going down more than five or six inches for two or three weeks in the spring, but in drained soil they have from two to three feet in which to develop early in the spring and consequently greater root systems are developed and the plants are able to take a greater advantage of the increased supply of plant food.

That is in short the general results of drainage, so far as the condition of the soil is concerned. There are one or two substantial and very important factors still and they are these. The drained soil is easier to till. You can put a drained soil in condition with just about half the labor required to put an undrained one in condition. Another thing is that the drained soil is easier on machinery than undrained soil.

When we have paid attention to our soil and drained it what are the financial returns that we may expect? I am not going to give you many experiences, but just those of some men who live among you in these counties of Essex and Kent.

T. S. Biggar, Farm Manager, Walker & Sons. In 1909, on drained land, we grew 80 bushels of corn per acre and on undrained 56 bushels; a difference of 24 bushels per acre.

J. J. Fletcher. When he bought his farm it was practically a mud pond. Where the land was formerly a mud pond he harvested three thousand bushels of

corn from 18 acres, and that shows the effect of underdraining as a factor in corn growing.

J. C. Thomas, Blytheswood. On his seed corn plot he had 82 bushels of shelled corn on drained land and 29 bushel on undrained land, making a difference of 52 bushel of seed corn between an acre of drained land and an acre of undrained. In stalks he had four thousand pounds on the drained land and 2,320 on the undrained land, which is a difference of 1,680 pounds, or three-quarters of a ton. On his ordinary corn crop he secured these results, 52.3 bushel of shelled corn and 18.9, call it 53 and 19. That makes a difference of 34 bushels of corn per acre. In his ordinary crop in the stalks he had 2,970 pounds and 1,420, a difference of three-quarters of a ton in favor of the drained land.

This is what underdrainage has done in these individual cases. Let me give you what it means per acre on the average. If we put the corn at 75 cents a bushel it means $26.60, and if we count the grain at 50 cents it would mean $18.00 an acre. These are reports of men who live among you and whom you know to be farming in the ordinary sense of the word, and if drainage means a difference of $15 or $18 or $20 per acre, how many years would it take for the drainage to pay for itself? It will cost you probably from $15 up to $50 per acre, but the average amount would be probably $25 per acre, and if you get $18 more in returns it will not take the underdrainage very long to pay for itself. The Government has made a provision under what is known as the Tile Stone and Drainage Act, whereby a man may borrow three-fourths of the estimated cost of his drainage provided that three-quarters does not exceed one thousand dollars. He may borrow the money from the township, or through the township, from the Government. The township issues debentures and the Government buys the debentures. If you borrow one hundred dollars under that system it would cost you $7.36 per year for twenty years. That is to say you can pay back the money in instalments. You can drain four acres of land for a payment of $7.36 a year, that is $1.84 per acre as an annual payment and you can get back from $10 to $30 per acre; as we have seen in these individual cases.

The time is coming when the traction ditcher will do the ditching from one end of this country to the other; but many of you are before me who will have underdraining to do by hand in the next year or two, and I am going to spend some little time in outlining to you some of the methods that may be used to advantage.

In years gone by a great deal of underdraining has been done by the eye and with good results in many cases; but we know from actual experience, that some drains are not working; and when we put on the levels we find that some are sloping the wrong way and others have "sags" in them; so I find it is better not to trust to the eye. It is much better to use a level and line and do it properly. The fall may be found by using a homemade drainage level.

Having dug the ditch within a few inches of its final depth, the next operation is to remove the remaining earth leaving the ditch bottom with an even fall throughout. Two cross heads are set up 100 feet apart, one at stake 0 and the other at stake 100. Both are put 6 ft. 6 ins. above the ditch bottom, the one at stake 100 thus being higher than at stake 0 by the amount of fall in 100 feet, that is if the fall is 14 inches in 100 feet, then crosshead 100 is set just 14 inches higher than cross-head 0. The stakes must be stout and driven firmly into the ground. A light cord, is then stretched tight and tied over the crosspieces, so that the sag is negligible. Since one end is 14 inches higher than the other, this cord has the same fall as the ditch bottom is to have, and hence if the latter is made

parallel to the cord it will have the required fall. It is necessary to provide a light testing or "travelling" stick 6 feet 6 inches long, since the cord is that height above the ditch bottom. With a narrow shovel the earth is gradually removed until the stick standing on the ditch bottom just passes under the line. When such is the case the ditch is deep enough at that point. When every point between stakes 0 and 100 just test 6 feet 6 inches from the over-head line, the grade of this section is uniformly 14 inches in 100 feet. Any other grade is arrived at in a similar way.

But how shall we place the cross-heads 6 feet 6 inches above the ditch bottom?

First. If not already known, we must determine the depth of the ditch at the outlet. A drain usually empties into another tile drain or into an open ditch, the depth of either of which may be determined by using the drainage level and the measuring staff as follows: Set up the level and sight over it at the staff, which is placed first on the surface of the ground. and second on the bottom of the main drain or of the open ditch, taking readings in both cases. Subtracting the readings, we have the depth of the ditch at the outlet. Suppose for illustration that is 3 feet 5 inches.

Second. We must determine the height the cross-piece at stake 0 is to be placed above the ground. This is done by subtracting the depth of the ditch from the length of the testing stick, *i.e.*, if the ditch is 3 feet 5 inches deep as supposed above. then cross-head 0 would be 6 feet 6 inches minus 3 feet 5 inches = 3 feet 1 inch above ground. One end of the cross-piece is clamped or nailed to one of the stout stakes at this height (3 feet 1 inch); the cross-piece is then levelled by means of the spirit level and the other end fastened to the other stake.

Third. We must find a point on stake 100 that is higher than cross-piece 0 by the amount of fall in 100 feet and fasten the cross-piece at that point. For instance, if the fall is 14 inches in 100 feet, cross-piece 100 must be nailed 14 inches higher up than cross-piece 0.

To do this we set up the home-made drainage level about half way between stakes 0 and 100, sight to both stakes, and put marks on the two stakes. These marks are level with each other. We now measure the distance between cross-piece 0 and the mark. Let us suppose cross-piece 0 is six inches above the mark. Then cross-piece 100 to be 14 inches higher must be six plus 14, or 20 inches above the mark on it. If cross-piece 0 is below the mark, we subtract the distance from the grade or the grade from the distance to find how far cross-piece 100 must be above or below the mark, *e.g.*, if the grade is 14 inches in 100 feet and cross-piece 0 is 6 inches below the mark, then cross-piece 100 must be 14 inches minus 6-8 inches above the mark. For any other grade the cross-pieces are set in similar manner. When they are thus placed. the cord which is tied stretched over them is 6 feet 6 inches above the ditch bottom and parallel to it.

To grade this second section of the ditch a cross-head must be set at stake 200. This may be roughly done by sighting it in line with cross-heads 0 and 100, but it is always wise to set up the level, and by means of it get cross-head 200 placed exactly the right distance above cross head 100. The same applies to subsequent sections.

In practice it is found convenient not to tie the line to the cross-pieces, but to simply pass it over them and tie a fairly heavy stone to it. This keeps it always at the same tension and takes up any stretch that may occur. As a heavy line sags some on a 100 foot section, it is usually found best to interpose one or two light cross-heads between the end ones, by which they can be sighted in position. Instead of intermediate cross heads some use two light sticks, bolted together at

the top like the letter A, with notches in one of them for the line, which may be raised or lowered either by the use of the notches or by closing or spreading the bottom of the sticks.

There are numerous devices for aiding in digging a ditch to the required grade, but the overhead line here described is, in our judgment, the best we have seen. We have known men who have abandoned others in its favor, but none who have abandoned it for others.

Laying the Tile. When the first section has been graded, and while the line is still strung, it is wise to lay the tile so that they may be tested to grade by the same line, a notch being cut in the testing stick at a distance from the end equal to the outside diameter of the tile. This gives the best alignment of the tile and the fewer irregularities there are the less danger of partly or wholly blocking with sediment. Another reason for not allowing the digging to get too far ahead of the laying is that rain is liable to occur at any time, causing the sides to cave in and otherwise interfering with the finished bottom.

Good joints need no protection against sediment, except in quicksand, but joints that are at all open should be covered to prevent sediment entering the tile while the earth is becoming set. Sods placed with the grass next the tile are excellent for this purpose. Tar paper also is good, but it should not go all round the tile, it should lack two inches or so. Of meeting on the under side. This precaution allows the water to enter the joint from below. There is practically no water enters through the pores of the tile. Some years ago I sealed one end of a 3-inch, a 4-inch, a 5-inch, and a 6-inch tile and set them in water one foot deep, sealed end downward, putting weights on them to hold them down. They were left in that position for 44 hours. At the end of that time the amount of water in them varied from one-quarter to three-quarters of a tumblerful, showing that water passes very slowly through the pores. Then it must enter through the joints. Hence the precaution of putting the tar paper around the top and sides only. When quicksand is encountered the tile may be laid on strips of board about six inches wide. In case tile have to be laid near water loving trees, such as elms, willows or soft maples, they are almost certain to be blocked with roots in a year or two. The safest plan is to sacrifice the trees. If this is not done, sewer tile should be laid in that section of the ditch and the joints cemented, but tile so laid do not drain the land through which they pass. The roots of fruit trees sometimes block tile when laid too shallow and too near the trees, hence tile in orchards should be laid rather deep and midway between rows of trees where possible.

Q.—Is it possible to have too much fall going through sand?

A.—Yes, just the same as too little, because if you have too much fall the water runs very rapidly and it creates little eddies at the joints which soon suck in the sand and by and by the tile will roll sideways or block with sand further down. It is found important by both experience and theory that we should have at least two inches fall in one hundred feet. Where there is any sand likely to get into the drains the water will roll the sand along provided the grade is sufficient. Through clay a steep grade is not so necessary, but where the grade is less we should increase the size of the tile. You will find in Bulletin 175 a table which gives the size of tile which should be used.

Q.—What about concrete tile?

A.—They are more porous than clay tile. We have been experimenting on cement tile for some time and have learned several things. We should have our tile about four of sand to one of cement, then the pores are just about full of cement and the tile are strong. If you make a thousand tile at seven to one it

will take 6½ bags of cement; six to one, 7.1; five to one, 9.1; four to one, 11.4; and three to one, fourteen bags. For four-inch tile it takes 15.1 bags to make a thousand; five-inch, twenty bags; and six-inch, 22.7 Allowing cement at $1.90 a bag, and sand at 15 cents a load at the pit, and not counting the haulding, it costs $5.67 to make one thousand 3-inch tile at 4 to 1. Two men working hard can make six hundred tile a day, although the manufacturers of the machine say that five hundred tile a day is about what might be expected. There are two places where I would not use cement tile and that is in muck, or alkali land. I cannot see any reason why cement tile will not last in clay, although they have not been in use more than a few years, not long enough to tell whether they will or not, but we know that the acid that is in the muck will attack the cement and the alkali in alkali land will also attack the cement, and these are two cases where they should not be used.

Q.—In putting in the tile drain would you put in the tile as close as you could lay them.

A.—Yes, in putting in tile I would make the joints just as close as I could, there would be plenty of room for the water to get in as fast as it can get to the tile.

Q.—Do you ever find any soil where the water cannot get to the tile?

A.—I know there are some soils said to be like that, but when I find a soil as close as that I would put the surface soil on the top of the tile. We usually find that in cases where it is claimed the water can't get to the tile there is some defect in the grades so that the joints have become cemented with some chemicals in the soil.

Q.—Can cement tile be made cheaper than clay?

A.—The material for 1,000 3-inch cement tile at 4 to 1 costs $5.67, and if labor costs you $2 a day, then cement tile will cost about $13.67. It depends upon the price of labor and material.

Q.—Is it a good thing to put straw on top of the tile?

A.—No, it is not necessary, and sometimes it forms a three-cornered channel on each side of the tile. The water runs along these and sometimes washes so much soil away that the tile roll sidewise and block the drain.

Q.—Explain the difference in the cost of drainage between four-inch tile and three-inch tile?

A.—Supposing we put drains four rods apart, each drain is draining two rods on each side and there is a width of four rods drained by each tile. Then it would take a drain 40 rods long to drain an acre which would mean 660 tile. Supposing we put in seven hundred for easy figuring. Three-inch tile at $10 and $15 for four-inch tile, seven hundred 3-inch would cost seven dollars and seven hundred 4-inch would make $10.50, which is exactly one half more for a tile. The labor will probably cost $14 per acre and the total cost with three-inch tile will be $21, and with four-inch tile $24.50. But the four-inch tile will carry pretty nearly twice as much water as three-inch tile, and if there is danger of the tile filling up it will take the four-inch tile twice as long to fill up. I would not have a three-inch tile to run longer than a thousand feet.

Q.—What size tile would it take to drain ten acres?

A.—It would take five-inch tile to drain ten acres, the fall being one foot in three hundred. If we had one foot in two thousand it would take seven-inch tile. It depends upon the grade as well as the area.

Q.—What do you think of a well in the centre of a drainage system?

A.—In five years I have only found one case where I thought it was justified. Sometimes you bore a well down in the earth and the water spurts up and you cannot drain into it.

Q.—What about sand traps?

A.—The sand trap is useful if your grade is slow. Then I would have a sand trap about every six hundred feet; if your grade is ample you do not need them. Supposing you have a steep grade and then a slow one, then it is sometimes advisable to put in a sand trap at the change of grade.

Q.—Would you recommend a tile drain where the upper portion has been ditched?

A.—I know several cases like that that are giving satisfaction.

Q.—Supposing you had a drain 130 rods long and 26 inches of grade?

A.—That is a fifth of an inch in a rod, 6/5 of an inch in one hundred feet. If your soil is sandy I would not consider that sufficient. I would put the drains a little deeper at the outlet and a little shallower at the other end.

Q.—It is a clay bottom.

A.—I would make them shallower at the upper end to get more grade, because while depth is desirable, grade is also desirable.

Q.—Where you have a good fall would you give the tile an extra fall at the outlet?

A.—Yes, that will keep them clear.

Q.—Is it any help to have the upper end of your tile open?

A.—None whatever. Every joint is open so that the air can get in. The land has sufficient air in it.

THE BREEDING AND DISSEMINATION OF PURE BRED CORN.

PROF. R. A. MOORE, MADISON, WIS.

I am pleased to be with the good people of Canada. I wish to state that while it is the first time that I have ever set foot on Canadian soil, Wisconsin has received a great many good things from Canada. During my experience in the Wisconsin College of Agriculture, we have received a great deal of benefit from our sister to the north. If I go back in the history of my grain breeding work, I wish to state that some of the best foundation stock which I secured and which started the great grain improvement work in Wisconsin, I received from Canada.

In the barley work Wisconsin has become famous. In 1898 we secured our first foundation stock, which was Oderbrucker barley, from Professor Zavitz of Guelph. We have tried to take good care of the stock which he transmitted to us, and I wish to say that after carrying that foundation stock through a four years' course in breeding we disseminated it throughout Wisconsin, and it became the famous barley of the Badger State; and to-day it constitutes 84 per cent. of the barley grown in Wisconsin, and Wisconsin, by the way, grows one-eighth of the barley in the United States. We feel proud of this, because it was our privilege to get it from our neighbouring country, Canada. Consequently I do not come to you as a stranger, but one who is acquainted with the ways and methods and who knows of the good things that are in Canada.

I am glad to be with you to speak upon this great subject of corn. It certainly

was a pleasure to come into this building this morning and look over the wonderful exhibits that you have here. Some of you cannot help but realize that you have wonderful corn; but if we go back a little way in the history of this great work and study what the future is going to be, you will then see the great possibilities that are brought about by holding a Corn Association meeting of this kind. You cannot realize, and there is no one here who can predict, what the future of the corn work will be if developed from the corn which is exhibited here. No one can tell in dollars and cents what this exhibition of corn means to this section of Canada. It is setting a pace for the farmers of this section of your country, and you are going to keep up that pace for many years. You have these certain varieties of corn, and you bring in a class of people who are going to think of corn and who are going to dream of corn, and who are going to go home and grow better corn in the future. This exhibition is to set you thinking along certain lines of corn culture, which line of effort is going to be a great thing for your section of the country in the future.

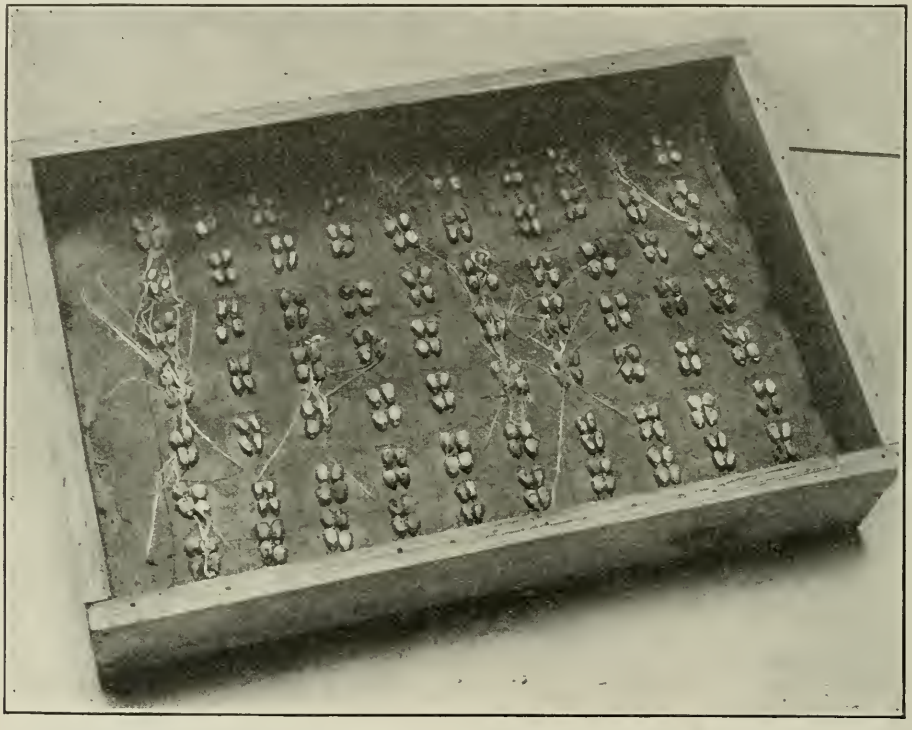
We started the improvement of corn in the State of Wisconsin twelve years ago. At that time we were growing 150 different strains and varieties of corn in our State. Every little section had its variety. Everyone within the State thought he had the best variety, and we had work in two directions to take up in order to accomplish the best results.

One thing particularly we had to overcome was the prejudice that some farmers had in favor of their own corn, and the other was to put in the place of the scrub variety a corn that would far surpass in yield anything that we had in the State.

The farmers in the State of Wisconsin are all from Missouri—they want to be shown—and I feel that it is all right to be shown before trying anything too quickly. We realized the evil effect of throwing the energy of the entire State upon 200 different scrub strains of corn. What we did was to get some of the best varieties and put brains upon the work of improving this corn and getting something to disseminate through the State which was far in advance of anything we had. Consequently we made a scrimmage throughout the State of Wisconsin, and we gathered over one hundred different strains of corn, and put them through a breeding test. Some did well under our breeding test, and others would not show the desired improvement, and finally after several years' work on the different varieties of corn we developed four or five standard varieties, and we are growing these varieties of corn in preference to other varieties throughout the entire State.

Now, just a word with regard to the methods. We gathered these varieties of corn, and tested them, and we got those strains that would admit of improvement. We established our breeding plots of two acres each, we planted a certain distinct number of kernels to the hill and the same number of hills to the row. Three kernels were planted in each hill and the hills three feet eight inches apart. We made a special study of this particular corn. The corn is open pollinated, and consequently we cannot grow it all on the Station farm, and we had to put some on the neighboring farms through various sections of our State. Therefore we carried on the work on many farms before we arrived at a definite understanding of that corn which we wished to select. We go into the field at the time the corn shows at its best, when it is fully tasselled, and when the ear of corn is in the milk; because we then can make the best study of the corn. We should make a study of the corn when the leaf development shows at its very best.

Wisconsin is the great dairy State of America, and we use the entire plant for forage, therefore we desired to have an exceedingly fine stalk as well as ear; consequently we put as much stress upon securing a corn with a nice stalk as we did upon a plant having an exceedingly good ear. We went down row by row in this corn field studying these stalks carefully until we came to what we called our ideal stalk. When we found a stalk of corn that had from 14 to 18 leaves, and which stood about seven or eight feet high and was uniform in its character throughout, and having but one great ear, it was that stalk we selected. We know that there are many variations in corn and many characters that we desire to look for, and the corn breeder must have a mental picture of an ideal corn plant in mind when he makes his selection.



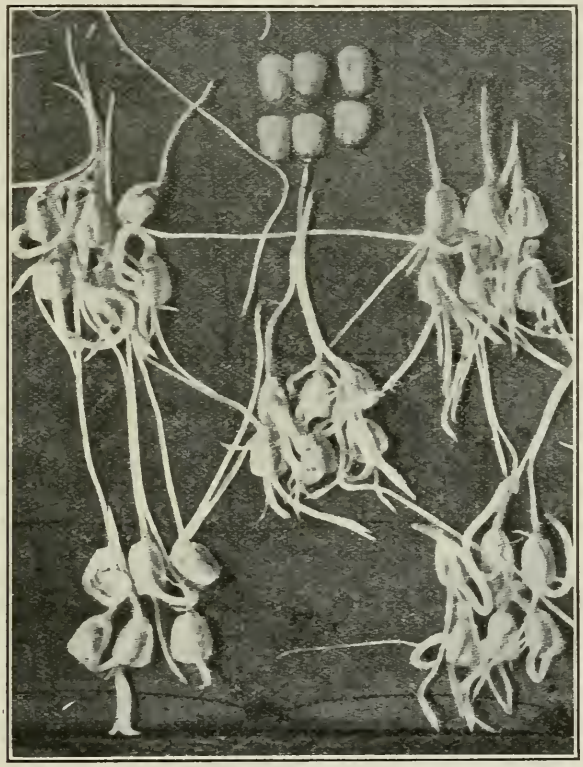
Showing bottom of home made seed tester. A damp cloth is spread over the corn and then a sawdust pack is put on top. A very low test is shown above; practically all ears from which seed was taken should be discarded, or crop will be a failure.

Corn is one of the most beautiful plants that we have for carrying on plant breeding work. We can get corn to carry out the ideas we have in mind in regard to variation. We can get corn to produce its ear within a foot or a foot and a half of the ground, or we can get corn that will produce its ear higher than we can reach; we can breed corn that will produce a stalk two or three feet high, or we can make corn produce a stalk 14 or 15 feet high.

You would be surprised when you come to apply the principle of plant breeding to the corn plant to know the wide variations we can accomplish in making it follow certain lines of effort. In our corn selection after securing the particular stalk we like we mark it by putting a spring clothes pin or string around it. We

then continued through the field in search of similar stalks or plants. After a little experience we can select the ideal stalks of corn more rapidly than we could at first. After we get three hundred of these particular stalks marked we let the field of corn ripen and then go through the field and pick the ears from the marked stalks.

We pick these particular ears and when they are husked some of them will disappoint us; some of the ears will not be perfect and we will cast out at once 150 of these ears. We then kiln dry the remainder. We find one of the chief essentials of corn progress is to kiln dry the seed corn. We kiln dry the seed corn

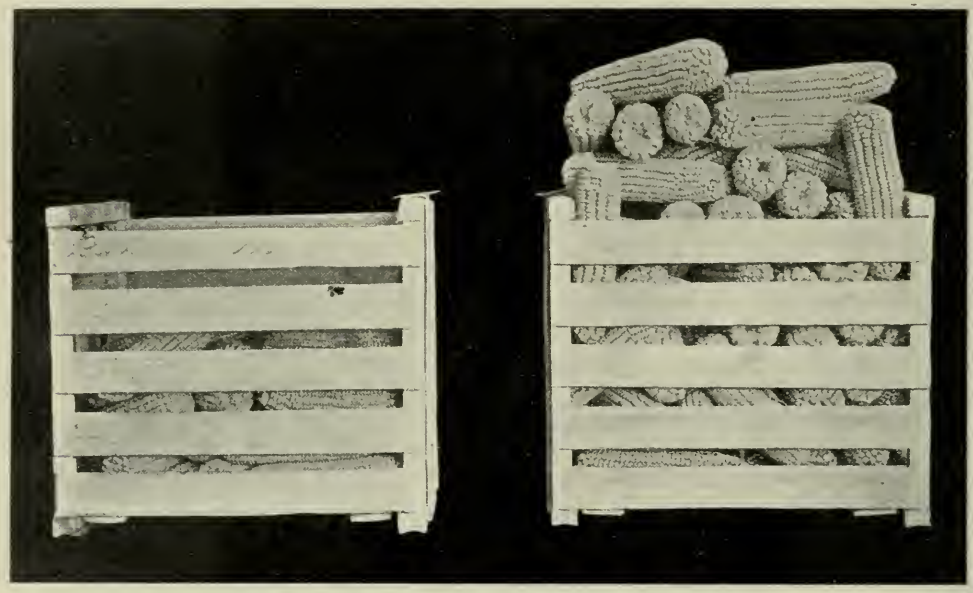


From four ears the germination is exceedingly good, from one it is weak, and from another no germination at all. The corn should not be used for seed that comes from ears of low vitality, or from ears the kernels of which do not germinate.

and put it through a germination test. We test all these ears taking at least six kernels from each ear, and whenever we find an ear of corn that is low in vitality, even if it germinates, we take that particular ear out and put it in the feed box. After we have tested 150 ears of corn we may cast out twenty-five as being lower in vitality than the other ears and then we use the other 125 that we have left in what is known as an ear-to-the-row test; this method not only applies to corn but applies to small grain as well.

Just a word with regard to what we are attempting to do when we plant corn in accordance with the ear-to-the-row method. We put, for instance, one

hundred ears in one hundred rows. We reject the butts and tips of an ear and put about two-thirds of the kernels of that ear in each row, planting the hills a definite distance apart and putting in a definite number of kernels to the hill. Here will be row number one, two and three and so on up to one hundred. In this particular test we have found that there will be a wide variation in the corn from a single breed. We find that an ear of corn has an individuality just as true as the individuality of a man. You know from actual experience that we often come across a man, and his neighbor will say that he does not succeed because he was born half an hour late and he has never caught up; and so it is with an ear of corn. We have hundreds and thousands of these ears of corn that were born half an hour late and will never catch up in field and the quicker we can get rid of them the better. It is not always the best looking ear of corn that is preferable. That



Ear-to-the-row method of corn breeding. Variation in yields of good seed corn from rows planted with seed from two different ears. Crate on left, row 18, 29 pounds seed corn; crate on right, row 11, 62 pounds seed corn. Good seed corn worth three dollars per bushel in the ear.

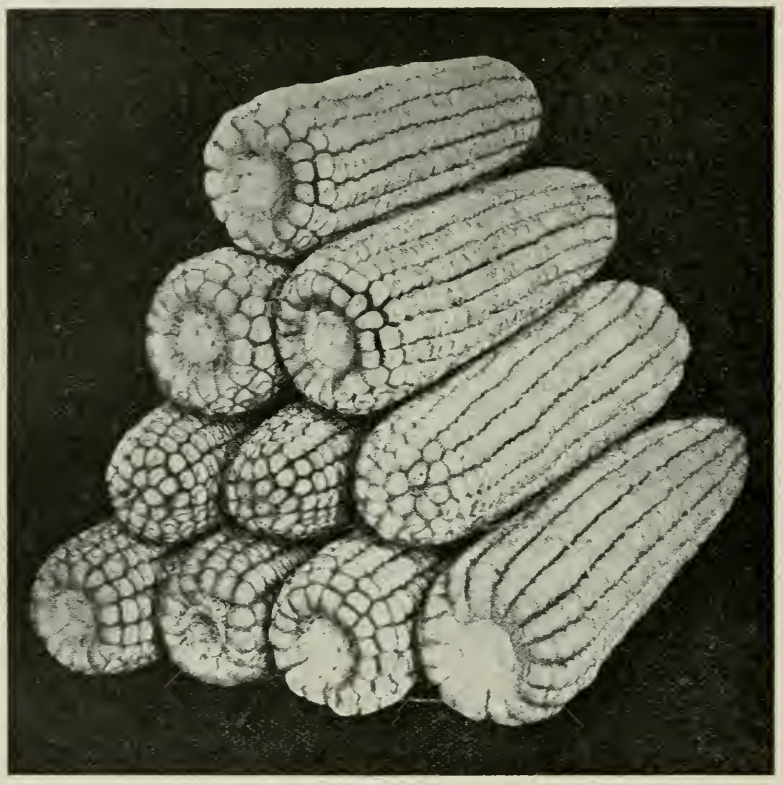
particular man who is born half an hour late, if you dress him up and put good clothes on him he will be a fine-looking fellow, but he was born half an hour late and that will always be against him, and we find it is the same with an ear of corn. No matter how beautiful it may be in appearance if it is half an hour late we do not want to have anything to do with it. How are we to find that out? Merely by putting it through this ear-to-the-row breeding course. It must give us its performance record and then we will be able to determine whether it was born half an hour late or not.

We have another class of people who do not succeed well in the world. Hundreds say, that man does not get along well he merely lives from hand to mouth. We have our ear of corn that just lives from hand to mouth. It will give 15 or 16 bushels of corn to the acre; just coming up to a certain average and it cannot get any higher. There is something in an ear of corn that you cannot see ex-

Characteristic field of Silver King Corn (Wis. No. 7). Yield of Station Farm, Madison, season of 1906, 76 bushels of shelled corn per acre.

ternally, but it is there notwithstanding, and the only way we are able to find out the quality of that corn is by testing its ability to produce both stalk and ear.

You know that in this great world of progress success is due not to the general mass but to a few who have not only energy enough in them to hold their own, but who have sufficient energy to go away beyond that of the average; and so it is with the ear of corn. What we are looking for is the ear of corn that not only can hold its own but double and treble the yield and quadruple, and in our breeding plots we have some ears of corn that have given eighteen times as much seed corn to the row as another ear of corn from the same breed. These are actual records. There is a big difference between seed corn and common corn. Ordinary corn is worth about 60 cents a bushel, but seed corn is worth $3 per bushel, and



Characteristic sample of Silver King Corn Wis., No. 7. Yield on breeding plot, station farm, in 1907—98 bushels of shelled corn per acre.

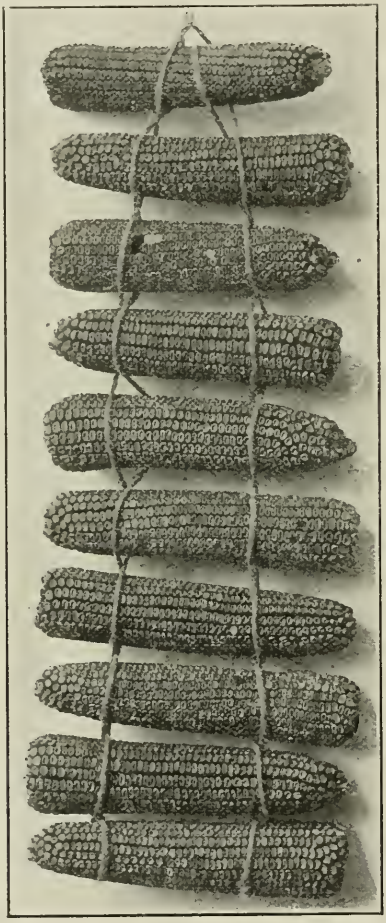
you can get that for it in all corn growing States. We have never had enough to supply the demand. We find that it makes a big difference in the State of Wisconsin, where land is worth $125 an acre, whether we are growing 60 cent corn or $3 corn. Consequently we have bred from corn that will throw regularly one good ear to the stalk and that is supposed to be a seed ear. Here is an ear of our Wisconsin No. 7. We have a corn here that when we started gave five per cent. yield of seed corn to the total amount of corn. That is just about what you will get with common corn about five or six ears out of one hundred that you would not be ashamed to crate up and send out to the farmers. That corn now gives from 30 per cent. to 35 per cent. of seed ears. That is what it has been producing.

Now here is what we do in studying the ear-to-the-row plot. We go along down the end of the plot and study the individual rows. How are we going to determine before hand which row is going to produce the best ears? Out of the 100 rows you might have only two or three that have these desirable characteristics that you wish to perpetuate in your corn. You are working along the rows and when you come to the particular row you should select you will see something about the leaf, the width of the leaf, the number of leaves upon the stalk, and not only the particular plant at the end of the row, but as you look along the row you see the same common characteristics down the whole row. You come to another row and one plant has certain characteristics and another plant in the same row has different characteristics, but when you come to the row that shows the same characteristics all the way through then you can rest assured that you have something worth while, and the row you are looking for. You then test the yield, which is very important. The yield of well-formed ears gives you the true test, and it then becomes an easy matter for you to propagate that particular strain of corn by holding to the three or four rows that you have been able to get out of this one hundred or two hundred rows planted in accordance with the ear-to-the-row method.

I find that some people have the idea that plant breeding is intricate—that it is only philosophers who dare undertake it or even think about plant breeding. I wish to state, after living fifty years in the State of Wisconsin, that I have come to the conclusion that it is the simple things that are the great things after all, and there are too many of us who are looking thousands of miles away for the great things when we have them to see and think about right near at hand. The work of plant breeding is a simple process of using good judgment. There is nothing hard about it; anybody can do it if they have the time, perseverance and patience. There is no reason why you cannot do the same thing that we are doing at the Experiment Station. We take some of these particular ears of corn that come from those certain four or five rows for our next one hundred or two-hundred-row test the following year, and the remainder goes into the general field, and you see that the next year we have eliminated the characteristics of the poor rows of corn, and we weld together the best elements. I wish to state that this particular corn which has been carried through now a course of eight years breeding has displaced all the varieties of corn that we formerly grew in the State. And why? Simply because there was the corn that would give a higher yield, and all a farmer had to do was to put it to the test. Our farmers do not accede readily that corn or anything else is better than what they have at home unless you show them.

We have an organization in Wisconsin that has done wonders in the way of helping us in the dissemination of pure bred seeds. Away back in 1901—eleven years ago—when we saw the possibilities of plant breeding, this thought came to me: The average man goes through life performing his little work, the energy of a man is like a single drop in a bucket. If we are going to accomplish great things in this world we have got to be able to get hundreds and thousands interested in the project we have in hand, and then by launching this tremendous energy of thousands of people on one central point, the obstacle, no matter how great, must give way. That is what we have attempted to do, and I wish to state right here that we got the thought from our good sister here in Canada, your Experimental Union. I felt that the average of the rank and file of our farmers would not carry this particular work of growing pure-bred grains on to perfection, and that the students of the Agricultural College would be the proper people to entrust with the carrying out of these tests.

We have bred four standard varieties of corn, of which I have two here. The Golden Glow is for the extreme northern part of the State and this, the Silver King, for the southern and central part of the State. We have one yellow variety which is an older corn and a heavier yielder, and then we have one extreme early corn which we grow up on the shores of Lake Superior. We have extended the corn belt from the central part of Wisconsin to the extreme northern part of the State, and to-day over 60 per cent. of the entire corn crop of our State is grown from these four distinct varieties of corn.

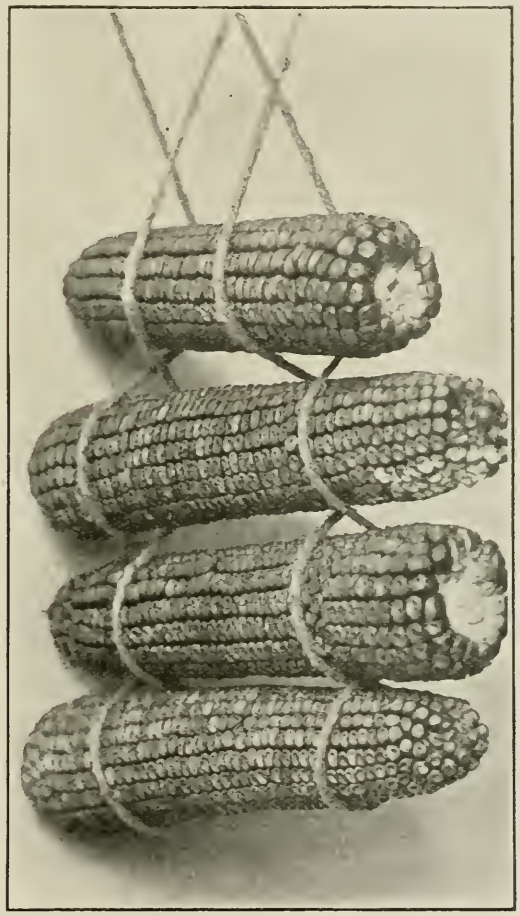


Double string method of hanging seed corn.

Another thing we have attempted to do is to eliminate the scoopshovel method of distributing corn throughout our State. You all know what the scoop-shovel method is. In the spring you send a five dollar bill to a seedsman and tell him you want five dollars' worth of seed corn. He grabs a scoop-shovel, runs to a bin of corn, and if you happen to want yellow corn he goes to the bin of yellow corn and fills the sack and sends it back; and you plant six or eight or nine different varieties. That is what we call the scoop-shovel method of selling corn. Now, I do not want to blame the seedsman too much, because there was a time in our

State when the seedsman could not handle pure-bred corn. He could not get it, and he had to depend on what he could get hold of; but it is different now, and our seedsmen are selling seed corn in the ear and you can now secure distinct varieties.

We have been working for thirteen years on these oats I have here; and these oats are being rapidly disseminated throughout the State. At the present time over 60 per cent of the oats grown in Wisconsin are of that variety. We would not have been able to accomplish that if it had not been for this organization of



Double string method of hanging seed corn, showing how string is started.

which I spoke. Our organization, which is known as the Wisconsin Experiment Association, is one of the greatest factors we now have in the State of Wisconsin for building up the College and for doing various work along agricultural lines. We desired a trained class of young men in order to grow and disseminate the grains we had been breeding upon the Station farm. We wished to have a class of young men who understood the judging of corn, and who understood the kiln-dry process of curing corn, and who were willing to try to break up this scoop-shovel method of selling seed corn and have the seed corn sold in the ear.

We organized the Association on February 22, 1901. A band of young men met at our College, and this message was brought to them: "Wisconsin is in need of another organization." A smile went over the faces of some of the boys. They thought, here is another opportunity where we can pay a fifty-cent fee and wear a badge. At that time the people of the State had been devoting a great deal of time and attention to the building up of fine breeds of cattle. We had the Guernsey and Jersey and Holstein cattle and the Percheron horse and the Clydesdale and so forth; but there had not been a single man come forward to champion a farm crop, and farm crops are the foundation upon which the best live stock industry is founded. I felt that the time was ripe to start the work, and I told these young men that if this work was carried on in a faithful and energetic manner the time would come when we would see Wisconsin the greatest seed-growing State in America, and they would be the ones that would receive the benefit from it. We secured an annual appropriation from our State Legislature to carry on this work, and at the present time we have a membership of sixteen hundred paid-up members who are actively engaged in seed-growing work, and this chart shows our method of dissemination. As soon as we have corn or other grain bred up to a standard that we desire, we put in a thousand seed-growing centres by giving each one of these young men sufficient seed to plant one or two acres the first year and to establish a grain-growing centre. He is requested to give or to sell to his neighbor that variety of grain, and show them by actual demonstration what the grain will yield in comparison with their own varieties of corn or grain. The following year fifty or one hundred acres can be put in and we get these pure-bred grain centres established all over the State. We have now fifteen hundred of them established within the State, and we are growing millions of bushels of select and pedigree seed grain. I felt that if the agronomy department of the College of Agriculture made a business of growing and selling seed grains we could put our department upon a paying basis; but I felt that the College is not established for commercial purposes; the object of the College of Agriculture is no more to make money than your district schools or your high schools are: but if we could encourage these young men upon the farms and give them an opportunity to make some money we should be able to solve the problem of keeping the young men upon the farms.

During the past decade there has been a great cry of the young men leaving the farms. In many of the New England States the farms have been almost depopulated. I know places where, seventy-five or eighty years ago, the land was worth $100 an acre, and it is now back to a primitive state; forests have grown up where once ran the plow, simply because the average young man would not stay upon the farm. The work was not sufficiently interesting, and he went to the city. I do not object to an occasional young man going to the city, but I do object to the city continually taking the very cream of what we need to build up the farming industry of the country. In our State 80 per cent. of the successful commercial business men have been young men who have learned their habits of industry upon the farm, and have carried that energy and vigor to the city to build up the city with their energy and vitality and vigor which we so much needed to build up the country, which of all places in the world is the best place in which to live. I felt that if we were going to solve the question of keeping the young men upon the farms we must give them an equal opportunity with their city cousins, and if we cannot do that then they are sure to leave.

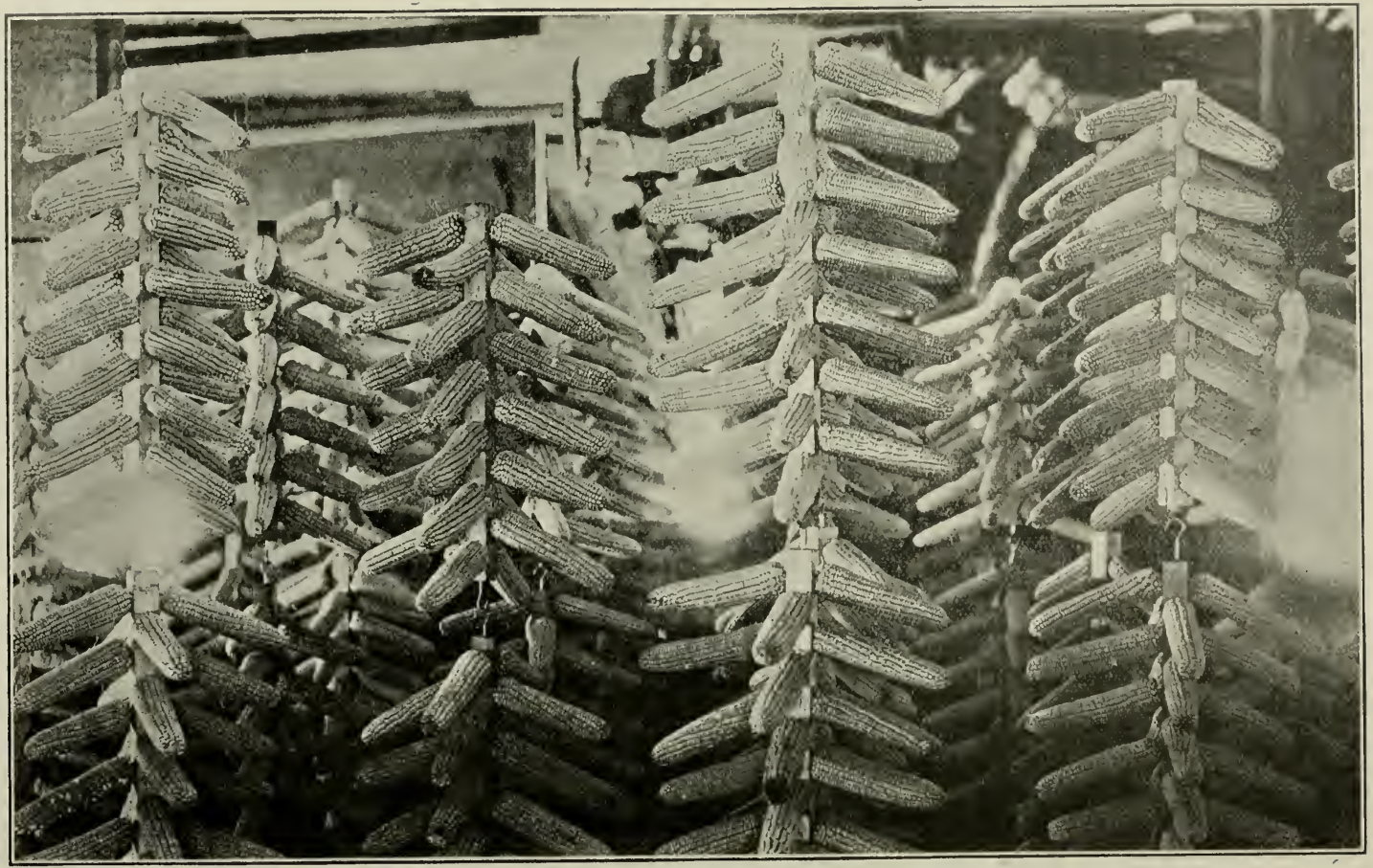
The College of Agriculture in Wisconsin has been a tremendous factor in keeping the young people upon the farm, and I know this Experiment Association has

been the means of sending hundreds and thousands of young men to the Agricultural College, and that is an important factor in keeping the young men upon the farm. We have not only disseminated corn in the way I have mentioned, but we have established a large number of seed grain centres all over the State where seed corn and other seeds can be purchased. If a farmer writes from any part of the State to Madison for barley we will refer him to a party who is growing barley right in his own neighborhood. We have sixteen hundred of these barley centres in the State, and we are now growing 80 per cent. of the barley of one breed or strain where formerly we were growing forty or fifty different strains. Often we would find in a single farmer's field eight or ten different strains of barley. You can now go into the State of Wisconsin and get a hundred carloads of barley of one distinct strain or breed. We have just carried through a thirteen-year test of what is known as the Wisconsin Pedigree barley, which was bred on the Oderbrucker foundation. Last year the pedigree barley was taken to Omaha and entered into the World's Class, and took first, second, third, and fourth premiums. Again, at the show in Columbus this year, the Pedigreed Oderbrucker barley carried off the Grand Champion Sweepstakes in the six-row barley class, showing that we have a barley that can be relied upon. Through a five years' test, in which 1,450 members of the Association took part, we find that the Oderbrucker barley has given us 5.6 bushels more per acre than the best barley compared with it. The farmers soon learn of these increased yields and secure the seed, and in that way we get large communities growing this particular strain of barley. It is the same with the Wisconsin No. 7 corn. You can drive through large districts in Wisconsin and you won't find a single farmer growing any corn except Wisconsin No. 7. Why? Simply because we know it is a heavier yielder than other varieties. I wish to state right here that fifteen hundred of the members of the Wisconsin Experimental Association carried on a test for five years, and they were advised to put the best corn in their neighborhood up against the No. 7, and they find that they got an average yield of 62 bushels per acre of shelled corn, while the best corn put up against it gave an average yield of fifty, so that they have twelve bushels more corn per acre with the No. 7 than the best corn put up against it

As I went through your corn exhibition this morning I saw a great many varieties of corn that I could see by the looks that actual brains had been placed upon the work, and I know it is going to pay you to continue this great work.

Now, just a word with regard to keeping the young men on the farm. We find that by getting them started in these grain-growing centres we have attracted attention, not only within the State but outside the State, and I will illustrate how it attracts attention outside of the State by live stock and seed grain centres.

We have people writing to the Experiment Station continually asking where they can get a car load or several car loads of Guernsey cattle, and our director will write back and say come to Wisconsin, and we will send you down through Michigan and into Ohio and Pennsylvania and you will be able to get a car load. Well, the man won't do that, because there is a little island right over near England where he can go and get a ship full of Guernsey cattle, and he does not need to travel over thousands of miles of territory picking up a few here and there. We have letters coming in asking where a car load of Jersey cattle can be secured, but are obliged to answer them in the same way. If they want Holsteins we immediately send back a letter, "Go to Lake Mills, in Wisconsin, and you can get as many as you desire." The fact of the matter is that the people in this community had sufficient foresight to all go into raising the same breed of stock, so this part of the State has become known far and near for its Holstein cattle. Other stock



Method of hanging seed corn used on Walker & Sons farm, Walkerville, Ont.

centres are now being established. Purchasers come from all parts of the United States to the Lake Mills district for Holsteins, because they know they can get them in large numbers.

The seed grain work is practically upon the same basis. The organization covers the entire State, and we have sixteen hundred members. We have now organized the counties so that all counties that have seventy-five members or upwards have an organization. The County organization is officered similarly to the State organization. The secretary and manager of the County organization is by virtue of his office appointed Farm Inspector of the County, and he goes around and in a careful way makes an inspection of the farms twice a year, and gives hints and suggestions to these young men who are growing seed grain. He advises as to keeping the seeds pure and the fields free from foul weeds, and sees that the corn is properly kiln dried, and gives helpful hints regarding the shipping of seed grains.

Ever since the Wisconsin Experiment Association has been in operation I have had the honor of being the manager of that Association, not because I was connected with the College, but because I happened to be the one who organized it. In a single day we have orders for no less than ten thousand dollars' worth of seed grain pass through the office to be referred out to the members of the Association. This Experiment Association is not only selling its grains to the farmers within the State of Wisconsin, but last year it not only sold its seed grains to practically every State in America, but had orders from Australia, Germany, China and Japan, and at the present time large shipments of this beautiful corn are going to Russia. How did the Russians, across the ocean, come to know that Wisconsin was growing corn? Simply because there is sufficient pure-bred corn grown in the State of Wisconsin of one variety to make an impression. People know that when they send for large orders of seed grain there is a place in Wisconsin where they can get them filled, and that is why the orders are coming in. Who receives the benefit? These young men on the farms who are engaged in the industry are receiving the benefit.

Now then, just let me give you a little story. A young man came to take the course in the College of Agriculture eight years ago. He was just old enough to enter the College—sixteen years of age. He became interested in this particular Silver King corn. He united with the Experiment Association, as it seemed to be the proper thing to do. When he was through he was given enough seed corn to plant a three acre piece, and when he came back to take the second year's work he said "I had a hard time getting father to plant that corn." He said, "My father thought there was not as much food value in it as there was in the yellow corn, but anyway he let me plant it, and do you know that corn yielded three times as much as father's corn, and he was converted to the idea of growing that corn." He said, "We are going to grow that corn next year, and I have made a deal with father." I asked him what deal he had made. And he said, "I am going to grow the corn, plant it, and take care of it and fill father's silo and fill his cribs with that corn, and I am to have the seed corn." I said, "That is all right, go ahead, and when you get that seed corn kiln-dried let me know and I will sell it for you. It will be worth $3 per bushel."

I did not think any more about it until in October I got a letter stating that he had three hundred bushels of that particular corn all kiln-dried, but he said he did not know what to do with it, as the neighbors around there thought $3 a bushel was too much. We should realize that a bushel of corn plants six acres four kernels to the hill, the usual width; consequently, if a man pays $3 a bushel for seed corn

it is only 50 cents an acre for seed. We thought the young man ought to have some recompense for the time and trouble he had been put to, and I wrote him and said, "I will refer parties to you," and within three weeks time I referred enough parties to that young man so that at the end of three weeks I received a letter saying, "Do not refer any more parties to me. I have sold the whole three hundred bushels, and I have got nine hundred dollars."

I thought to myself what a fool I have been. I went into a district school and taught for five years before I laid up nine hundred dollars, and this young man has gone back to his farm with one-tenth the education I had, and he lays up nine hundred dollars within four months' time. Do you think that young man is going to some large city and is going to trust himself to city life? That boy is wedded to the farm; and last year that boy sold several thousand dollars' worth of seed grains. He is growing this No. 7 corn, Oderbrucker barley, and the pedigree oats.

Just another story. A young man from the Main College at Columbus the day before yesterday came to me and he said, "I hear your young men who are members of the Experiment Association are selling seed grain and shipping it out to other States; is that so?" I said, "Yes, sir." And he said "Do they sell any amount?" and I said, "Yes," and he says, "How much?" and I said, "Some sell a thousand dollars' worth, two, three, four, five and six and ten thousand dollars' worth." And he says, "Oh, go on." I said, "Well, it is a fact." Then he said, "Are there any members of that Association down here?" I said, "Yes; there is a member right over there in the Wisconsin booth." He said, "How much does he sell?" "I do not know; I never asked him," I said. He said, "I would like to know, call him over." So I called the young man over and said, "Do you sell seed grains?" "Yes, sir." "Do you grow them on your farm?" "No, sir, not all of them. I have farmers growing seed for me on contract, but I manage the growing of these grains." "How much did you sell last year?" "A little over $9,000 worth." "Are you going to continue in the work?" "I am." "How much do you expect to sell this year?" "I expect my sales to run up to $12,000."

This young man had come to our College nine years ago and went back on the home farm, and three years ago his father was going to sell the home farm. But the young man had been working for his father upon the farm, and he said, "Father, I do not like to see you part with the farm." The father says, "Well, I am getting old and I have to part with it." The boy said, "I would like to buy the farm." The father said, "You have a little money coming to you, about two thousand dollars; if you are willing to put that money into the farm I will trust you for the remainder. I want $16,000 for the farm." It was a 240 acre farm, and the boy took it three years ago, and he will nearly clean up the mortgage upon the farm this year. Do you suppose that young man wants to go to the city? No; he does not want to go to the city, for he knows where he can make money in the country.

We had a young man, a widow's son, come to the College of Agriculture seven years ago. The father had died, and had not made a real success upon the farm. This boy had about one hundred dollars that he had earned. "Now," he said to his mother, "If you want me to run this farm, I feel as though I ought to go to the College of Agriculture. I understand that at the College they teach a man twenty-five ways of earning a dollar, where he only knew one before coming."

That young man came down to the College, and I remember yet that he was a sort of modest student. We have some come down there who will almost talk you to death, and others who are quiet and you can hardly get them to talk at all.

He did a good deal of thinking all the while. You could see that he was running his thinker. He got to looking over his corn; he became a member of the Experiment Association, and he went back to his farm and started growing not only corn but this Oderbrucker barley, and he showed such interest in this work that when we got ready to organize Dodge County I sent a letter to him, and said, "The time has come when you ought to have a County organization." And he organized the County, and the young men of that county showed such an interest in him that they elected him secretary and manager of their County Association, and I appointed him farm inspector by virtue of his office; because I wanted to get him in close touch with his members. We do not pay the officers of this Association, we use the money for actual things. We paid him for his work, and we pay several others for the same kind of work. He was down at the Annual Convention when we had nine hundred of the boys in attendance, and he gave an idea of the amount of seed that was sold in his County. Some young men, only twenty-one or twenty-two years of age, cleaned up $1,500, $1,800, and $2,000. Others sold $4,000 and $5,000 worth of grain, cleaning up considerable ready cash. Finally, I said to him, "Mr. Kruger, you have not told the audience what you sold yourself. I wish you would tell them." He said, "On the third day of February my books showed I had sold $15,000 worth of seed grain." Do you suppose he wants to get to the city? No, sir. That young man has been able to surround himself with some of the comforts of life that our city brothers have, and that is the problem we have got to solve for keeping the young men on the farms. We must give them an opportunity to surround themselves with the comforts that you have in the city, and then you will keep them on the farm; but you are not going to keep them there and hold their noses to the grindstone all the days of their life, and we do not blame them if they leave the farm if that farm becomes a treadmill where they are merely going to work out an existence.

We feel, through the opportunity we have given these young men, that we are keeping them upon the farms. At the present time we have several thousand young men who have taken work in the College of Agriculture who are now upon the farm. About 96 per cent. of the young men who have taken the short course in agriculture in the State of Wisconsin are upon the farms, and that is a good record.

Three thousand five hundred young men have gone down to the College of Agriculture to take the work in the manufacture of butter and cheese and are operating cheese factories and creameries largely in the State of Wisconsin.

Years ago in the State of Wisconsin we grew wheat until we had a first-class wheat mortgage on every other farm in the State. I know my father often boasted that he had grown wheat for twenty-two years on the same piece of land, and he was still able to grow wheat; but I believe he robbed the soil. The Wisconsin Dairymen's Association was organized about this time, and the members of that told us plainly to our faces that we were "soil robbers." We were in a desperate condition. When a man is about to lose his home he is usually in a desperate condition. We were told to go into the dairy business, and we acted on this advice. Communities that did not know what a cheese factory was, within a few years had numerous cheese factories and creameries, and then we started the great dairy school in the State. It remained for the backward State of Wisconsin to be the first State in America to build a dairy school. Ever since the dairy building was erected from one hundred to two hundred young men have been educated in the art of making butter and cheese annually, and co-operative factories have been established everywhere, and at the present time Wisconsin has 2,995 cheese factories and creameries. Last year our dairy products brought to the State seventy-two million

dollars, and that has been brought about largely by these young men who have been educated in the making of butter and cheese.

As I come here and look at the class of boys that you have here taking up this corn-growing work I feel that you are starting in the right direction. We have been getting at the boys too late in life, and after they have been educated away from the farm. We glory in our wonderful system of high schools, and yet we can hardly find a boy upon the farm who has had a complete course in the high school. We have been educating the boys away from the farms. Now we are establishing agricultural schools to educate the boys for the farms. When I saw these young boys studying corn with you, I thought it was well worth my while to come from the State of Wisconsin to see those boys cutting open a kernel of corn and studying the germ and the different parts of the kernel. Some men think there is not very much to study about an ear of corn, but there are mysteries about it that require the most profound study.

In order to help our County Fair Associations and make them more educational in character we started what we called our young people's corn and grain contest, and I was glad that I was able to give them this Oderbrucker barley and No. 7 corn and Golden Glow corn and all these beautiful varieties of pure-bred grain. You cannot handle these pure-bred grains but what you become better for it. There is something about a pure-bred grain that makes you a better man after handling it; and the same thing with a man who works with pure-bred cattle, he becomes a better man, he attracts attention and the people appreciate the efforts he is making. For instance, a farmer driving through the country will pass herds of scrub stock and scarcely notices them, and then he comes to a herd of Holstein cattle. There is something about them—the sameness of size and color and the spots upon the cattle—that attract attention. You can no more pass a field of No. 7 corn than you can pass a fine herd of Holstein cattle without it attracting attention; and the longer you work in a field of that kind of corn the better man you will be, because there is something about the environment you are in that helps you to better things in life.

A great many fathers upon the farms make a mistake by not taking their boys into partnership with them, and giving them an opportunity to do something upon the farm. Give them something they call their own and let them take some of the responsibility of the farm. Even if they happen to be beaten once or twice in a trade give the boys a chance to do something.

Some people say that we are teaching the young men to make money, but I tell you that if we are to keep them on the farms it will be necessary to teach them how to make money. I claim that the young man on the farm is as deserving of being rewarded for his efforts as his city brother. We must give these young men in the country an opportunity to come into possession of sufficient funds in order to get the proper stock and machinery to operate the farm. They must be enabled to have fine horses and cattle and be prosperous, and when we do that we will have solved the problem of keeping the young men upon the farm.

ADDRESS.

C. C. James, Deputy Minister of Agriculture, Toronto.

I see upon the walls the announcement of a production referring to the Holy Land. This southwestern section of the Province of Ontario seems to me might very fittingly be called the Promised Land. When I came down to the station at

Toronto last night, we found that nearly all the trains were hours late. There was a storm sweeping over all the northern and eastern part of Ontario, such as has not been known for thirty years, and I wondered whether, after all, we would be able to reach Chatham. However, a special train was put on, and when I stepped off the train last night I simply looked around and wondered whether I had not got into another part of the earth.

I wonder if you people in the southwestern corner of Ontario know what a country and climate and other natural conditions you are blessed with. If you know what you have, are you making the right use of them? What are you getting out of the work?

You are producing more corn, and I am told, better corn, and even one who is not an expert corn man can see that you are making steady and rapid progress in the quality of the goods that you are putting out, and as a result of that I presume you are making more money. In fact I know that those who are directly concerned in this corn improvement question are making more money.

I suppose everything is going along all right, and your land is going up in value, and your farms are being improved, and your fences being straightened, and your buildings enlarged, and you are getting more out of life.

The last speaker referred to the production of corn from the financial standpoint, and he very wisely stated that unless you can make a farm pay, you cannot hold the boys, or in fact the farmers themselves, upon the farm. There is no question about it but this is the key to the situation. We must make this business prosperous, if we are going to hold the best farmers and the farmers' best sons upon the land. We are doing that—that is being accomplished—and those of us who have an opportunity of going from one end of Ontario to the other, throughout the year, have been impressed, very strongly, during the last two years with the fact that a great movement has set in in connection with the agriculture of this Province, and that it is manifesting itself, not simply among the corn growers of Essex and Kent, and the apple growers of Norfolk, but all along the line. Wherever efforts have been put forth progress has been made, instruction has been given, a new spirit has got into the farming community. A few years ago it would have been utterly impossible to have got men like yourselves to come down to the city or town, to sit here by the hour and listen to people talk to you about corn; but the question has taken on a new phase, and the farmers are becoming interested. I had an illustration of the same thing in the extreme eastern part of Ontario, two weeks ago. A little over two years ago there was a question as to whether the Winter Fair at Ottawa, which was concerned more particularly with live stock, dairying and poultry, should be closed up, and we should give it up as a bad job. There were few in attendance, and the exhibits were of a rather inferior kind. That was two years ago. During these two years, however, a great change has come over eastern Ontario. Through the holding of such Institutes and through the holding short courses in live stock and through a great variety of means and methods that have been put into operation there has been created throughout the section an interest in live stock such as has never been known before. The result was that at the Exhibition held two weeks ago the new buildings that have been erected to accommodate the dairy class of cattle and the horse classes were inadequate. The poultry exhibits were beyond anything that had been seen before, and the farmers were there by the hundreds from all over Eastern Ontario. As I stepped up to address them, I looked into the faces of men such as I am addressing this afternoon, men whom you recognize as being pros-

perous and successful in their work. You farmers are in a fair way to improve your financial position, but there is something I would like to say, as I said to the teachers upstairs: We have all, first of all, to make a living. We could not live if we did not have the wherewith. It is a prime necessity that a man, especially a man who has a family, shall conduct his work in such a way that he shall make sufficient money to maintain himself and his family at least in comfort, and give a proper education to his children. We are all working along that line, but we are missing the true end and aim of life if we make that our sole ambition; and if we concentrate our minds simply and solely on the dollars, or the one hundred dollars, or the one thousand dollars, and at the end of the year if this is all we get out of our farm work, and our crop production and our corn growing, we have been making a very serious mistake, and a mistake that is of greatest consequence to ourselves in particular. What does this instruction in connection with corn growing mean? It means first of all that we may improve our crops, get better crops and more out of our land, and have better returns. But there is something outside of that that we ought to keep carefully in mind, and that is that while we continue that we should get more out of life as we go along. The man who is aiming simply and solely at producing so many thousand bushels of corn which he will sell for so many thousands of dollars, and keeps that only in his mind, is living not in the present but in the future, and when he has accomplished that he is simply looking ahead to the next time when he will repeat the same thing. But if through organizations of this kind and instructions such as have been given here, the farmer who is engaged in corn growing knows that while he is preparing his field he is doing it for one reason, and he understands the ground upon which the corn has been planted, and understands the purpose of cultivation and drainage, he will cultivate that field not simply for the sake of making more money, but he will cultivate it because he knows why he is doing it, and he will take greater pleasure out of it, and he gets his reward as he goes along.

The point I want to make is this, that this education campaign is intended, not simply for the dollars and cents which are in it, but which are of very great importance, but it is also intended to make the farmers have a better life and have a better life while they are making this money out of their crops. If we engage in an industry which we do not understand but which is simply aiming at larger crops and more money, we are simply making slaves of ourselves to ourselves. There is more real pleasure and contentment to be got out of agricultural work than out of any other line of work that I know of. (Applause.) Yes, and there is more downright drudgery and misery to be got out of an agricultural life than out of any other. It altogether depends—and that is the sum and substance of my talk this afternoon—it altogether depends on whether we are going to get that satisfaction out of our life, whether we are going to make mere drudges of ourselves and become hewers of wood and drawers of water for other classes of the community. It all depends upon the attitude in which we place ourselves towards our work, and how we study the question of doing our work, and how we equip ourselves for carrying on that work.

Down here in this southwestern part of the Province you have, I suppose, the choicest bit of the whole Province, and I was going to say I could go farther than that: I don't think there is another section in the whole Dominion of Canada covering some three or four counties that is capable of making the production that you are here in the counties of Kent, Essex, Lambton, and the adjoining counties. You have here the possibility of production to the utmost limit. You

have lines of production that are intensely interesting. You have climatic conditions that are most favorable, and it entirely depends upon the attitude which you take towards your work, and the way in which you equip yourself for that work. This corn show, this educational campaign, will fail of its ultimate object unless, in addition to making you more prosperous farmers, it makes you better men, men who are getting more enjoyment out of life, men who are giving your families a better home and better home life, and building up a community which will be the admiration of all who have anything to do with it. You have an opportunity through this organization and in this instruction work to improve your social, and your mental, and your working conditions. And now I tell you gentlemen, you men who are living on the farms of Essex and Kent and Lambton, that if you do not get out of life the best that is to be got, it is your own fault. Everything possible is being done to help you along. The main thing is that you are to continue to take advantage of these opportunities you have already begun. The opportunities are still here, the possibilities are as great as ever, and in sitting down I simply wish that from year to year you shall not only continue to be prosperous as growers of corn and beans and producers of bacon, but you shall become known as better and better farmers, and more prosperous and more devoted citizens of this Province. (Applause.)

BREEDING INDIAN CORN IN THE SOUTHWEST.

Prof. L. A. Moorhouse B.S.A., M.S., Stillwater, Okla.

Oklahoma, "the Land of the Fair God," will undoubtedly become a rival of a few of the states which are commonly classified in the great corn belt. Starting in 1898 with an acreage which did not exceed the half million mark, Indian corn has continued to increase in acreage until more than five million acres have been set aside for the cultivation of this cereal within the new state; and we have every reason to believe that this field may be extended still further; thus more land will be planted of corn within the coming five or ten years. Through the adoption of better methods of farm management, and by giving greater attention to the selection of first grade seed, a feature which goes hand in hand with judicious tillage, it is certain that larger quantities of corn will be available for market purposes; the Oklahoma grower will, therefore, continue to draw a substantial revenue from the sale of grain, or from the sale of products which have been made possible through feeding the corn or fodder in accord with an approved system of live stock husbandry. There are important changes represented in this transition. A few years ago winter wheat was grown almost to the exclusion of all other cereals in the north central counties of Oklahoma, but at the present time the Indian corn plant occupies a very prominent part of the rotation on many of these wheat farms. The golden grain which is usually harvested about the middle of June in the southwest has been supplanted by Indian corn, and the marshalled rows of stalwart stalks now stand like a vast army guarding the heritage of the farm.

The Grower has a Real Problem to Solve.

In this south land we are compelled to meet certain conditions which are not favorable to the production of large yields. While our rainfall is usually abundant during the growing period, the distribution is frequently not so well

regulated as it might be: consequently the crop often suffers for lack of moisture, more especially on those fields which do not receive good cultivation prior to the time of planting. This factor may be controlled largely by the grower and every effort should be made to bring the seed bed into the very best form; but after this work has been accomplished there are influences beyond the reach of the grower which must be governed indirectly and it is here that the intelligent breeder has an opportunity to exercise his skill in manipulating unseen forces. The corn crop finds a normal environment and makes its best growth in sections or districts where the mean July temperature does not exceed 80 degrees F. It may be observed that the temperature is frequently advanced several degrees beyond this point in the southwest, and during such periods the crop may be damaged seriously When the hot winds blow continuously for several days and the corn plants are subjected to a very severe test the pollen becomes ineffective through this scorching process and imperfect fertilization is the result. Low yields are usually reported after the crop has passed through a season marked by high temperatures. This difficulty may be overcome in part by planting early varieties of corn. This gives the plant a chance to reach the age of maturity before the hot winds prevail and normal yields can be harvested. In the second place, we believe that it is possible to combine the characteristics of varieties which have been cultivated for several years under what we might term abnormal conditions and from these crosses the grower may be in a position to develop a strain with drouth resistant qualities so pronounced that at least forty or fifty bushels of corn per acre will be forthcoming in spite of dry, hot weather.

The Prospective Breeder has Some Desirable Strains at his Disposal.

Careful investigations have shown that many of our varieties of corn are well adapted to the areas in which they have been grown for several years, but it is also a fact that many of these types are deficient in one or more qualities that should be much more in evidence. In southwestern Oklahoma some of our Indian tribes have cultivated a type known as "squaw corn," for several seasons in succession. Some affirm that this type has been planted in these districts for at least one hundred years, and although no attempt has been made to change the general form of nature of the plant. it does possess some excellent qualities. Squaw corn is an early maturing variety, and when planted side by side with some of the larger types, it will return fair yields during the unfavorable seasons when the improved types fail. This well known Indian variety is, however, not a high yielding corn, but by crossing this type with a productive strain like Boone County White or some other standard variety, the drouth resisting characteristics of the parent Squaw corn and the productive efficiency of the Boone County White may be combined in the resultant progeny. Some very successful crosses have been made and comparative field trials in the near future will enable us to determine whether the new product can be used as a substitute for the best types that are now cultivated. Our field trials have also demonstrated the fact that early varieties of corn like Kellog's Pride of Saline, Graves' Cow corn, and Sixteen to One, as well as some other minor types, make first class yields under temperatures that are detrimental to high production in the case of later maturing varieties. It has been suggested that crosses might be made between the two types under consideration and thereby secure a product which will bring more bushels per acre under the climatic extremes which are experienced in this country. The

corn grower may also gain something by importing varieties of corn from sections of the country where the rainfall is somewhat limited and the temperature comparatively high throughout the growing season. Indian corn grown under such surroundings, possibly for centuries, must surely possess to some degree at least the qualities that will enable the plant to grow to maturity and produce normal yields under a climate which is almost the same as the native home of the imported stock. Dwarf Mexican June may be included in the latter list.

The Score Card for Indian Corn probably has some Defects.

The score card has been applied in selecting seed corn much in the same manner as the score card is used in judging live stock. Recent studies lead us to question the advisability of basing our judgment wholly upon the items which are inserted in the average score card. While it is true that the ears in an exhibit should be similar in size, shape, color, and indentation in order to present a favorable appearance upon the exhibition table, the score card does not assist in isolating individual ears which under practical field trials will give a high relative efficiency from the standpoint of productiveness. Furthermore, the score card insists that the tips of the ear should not be too tapering, but they should be well filled with regular uniform kernels, and it also states that the rows of kernels should extend in regular order over the butts. A careful examination of a large number of ears produced from individual selections last season appeared to indicate that ears with well-filled tips had a tendency to be somewhat shorter than the average ears of the breeding plot, and they were also located on rows which had a very poor performance record. The selection, therefore, of our ears must ultimately result in a reduced yield per acre. The score card has some value in that it directs the attention of the student to form, color or market condition; and it encourages a spirit of investigation because specific items are placed within our mental balance; but from the breeders' viewpoint we ought to have some radical changes in these values, and the new features should be so outstanding that productive types will be brought into the foreground.

High Efficiency Should be the Basis of Selection.

The average yield of corn for the State of Oklahoma does not exceed twenty-five bushels per acre. On many farms fifty and sixty bushels per acre are reported and this means that many do not secure more than ten or twelve bushels, or in other words, they fail to harvest a sufficient amount from their fields to meet the cost of production. Shiftless methods of cultivation or soil management with no thought concerning the value of selected seed may be given as a reason for these low yields. Still better returns than fifty bushels per acre are made possible through the selection of individual plants which possess more than average merit. The season of 1908 was not an ideal corn year in central Oklahoma, and yet, under these unfavorable circumstances certain individual plants in our breeding plot produced as high as eighty-four and a fraction bushels per acre; the same plot contained individuals which did not give more than forty-six bushels per acre. The same feature was apparent in plots which were located on upland areas that are not well suited to the production of Indian corn. If these high producing individuals can be isolated, and if the efficiency represented in these types can be carried over into the general field, it will be possible to secure results on the

average farm that will be far in advance of the most enthusiastic breeder. Much has been accomplished merely by sorting the best ears from the general field plantings; greater attainments may be ours provided the selected ears are compared in a test plot for the purpose of giving a chance to reject the low yielding types.

Individual Plants which Have Merit Ought to be Isolated.

The *American Breeders' Association has outlined a plan which is worthy of some notice on the part of men who are anxious to increase the quality and yield of their product. In place of using ears from the rows in the test plot which have given a high yield, the grower goes back to the remnants which have been saved from the original ear, and he plants this selected material in the isolated breeding plot. Under this plan a portion, say one-half of the corn from each selected ear which is set aside for experimental work in the ear test rows, is shelled, placed in a small jar and set aside for planting after the initial step has been taken. These jars must be properly numbered, and they should be stored in a room where they will be free from any damage by excessive moisture or any chance to be destroyed by rats or mice. At the end of the growing season the yields of the test rows are computed and the most desirable individual plants may be singled out for further study. By comparing the numbers of the test rows with the jars which contain the remnants, it will be an easy task to select the very best material for the breeding plot the succeeding year.

*American Breeders' Association Report, Vol. 3, 1903, pp. 110-112.

FORTY-FIRST ANNUAL REPORT

OF THE

Entomological Society

OF ONTARIO

1910

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To the Honourable John Morison Gibson, K.C., LL.D., etc., etc., etc.

May it Please Your Honour:

The undersigned begs to present herewith, for the consideration of your Honour, the Report of the Entomological Society of Ontario for 1910.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1911.

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FORTY-FIRST ANNUAL REPORT

OF THE

Entomological Society of Ontario

1910

To the Honourable James S. Duff, Minister of Agriculture.

SIR,—I have the honour to present herewith the Forty-first Annual Report of the Entomological Society of Ontario.

The Forty-seventh Annual Meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 3rd and 4th, 1910. The proceedings are given in full in the following pages, and include the reports of the various officers and branches of the Society, together with the addresses delivered and the audited financial statement of the Treasurer.

The "Canadian Entomologist," the Society's monthly journal, has been issued regularly during the past year, and has now completed its forty-second volume. It continues to maintain the wide circulation and high scientific value which have characterized it in the past.

I have the honour to be, Sir,

Your obedient servant,

EDMUND M. WALKER,

Editor.

Biological Department,
University of Toronto.

PROFESSOR TENNYSON D. JARVIS, B.S.A. (Ontario Agricultural College, Guelph). President of the Entomological Society of Ontario, 1908-1910.

PLATE A.—1. Work of Lesser Apple Worm. Note the large area injured. 2. Feeding punctures of Plum Curculio made by the new beetles in autumn. 3. Cherry Fruit Flies. (Natural size.) 4. Opened Cherry showing maggot about full-grown inside.
(See pages 21 and 24.)

PLATE B.—5. Sweet Cherry tree on the left almost completely defoliated by the Slug; tree on the right only slightly injured. 6. Galls on White Spruce caused by *Chermes similis*. 7. Galls on Norway Spruce caused by *Chermes abietis*.

(See pages 24 and 26.)

Entomological Society of Ontario.

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Director of the Experimental Farms of the Dominion.
Bethune, Rev. C. J. S.....Guelph.
Professor of Entomology, Ontario Agricultural College.

The Entomological Society of Ontario.

ANNUAL MEETING.

The forty-seventh annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 3rd and 4th. Professor Tennyson D. Jarvis, President of the Society, occupied the chair during the day meetings, and at the evening session the meeting was presided over by Mr. C. C. James, Deputy Minister of Agriculture for Ontario.

Amongst those present were Mr. H. H. Lyman, Montreal; Dr. C. G. Hewitt, Mr. Arthur Gibson and Mr. Groh, Central Experimental Farm, Ottawa; Prof. Swaine, Macdonald College, St. Anne's, P.Q.; Mr. John D. Evans and Miss Evans, Trenton; Mr. F. J. A. Morris, Trinity College School, Port Hope; Dr. E. M. Walker and Messrs. C. W. Nash, J. B. Williams and A. Gummer, Toronto; Prof. Needham, Cornell University, Ithaca, N.Y.; President Creelman, Professors C. A. Zavitz, W. H. Day, S. F. Edwards, E. J. Zavitz, C. J. S. Bethune, Messrs. J. E. Howitt, J. W. Eastham, L. Cæsar, D. H. Jones, Morley Pettit, of the staff; and a number of the students of the Ontario Agricultural College.

Letters expressing regret at their inability to attend were received from Dr. William Saunders, Director of the Dominion Experimental Farms, Ottawa; the Rev. Dr. Fyles, Hull, P.Q.; Prof. Wm. Lochhead, Macdonald College, P.Q.; Messrs. R. C. Treherne and G. E. Sanders, Central Experimental Farm, Ottawa; Messrs. A. F. Winn and G. Chagnon, Montreal; Dr. Watson, Port Hope; Mr. C. E. Grant, Orillia; Mr. A. Cosens and Miss Brodie, Toronto; Mr. R. S. Hamilton, Galt; and Prof. J. Dearness, London.

On Thursday morning a meeting of the Council was held, at which the report of the proceedings during the past year was drawn up, and several questions concerning the welfare of the Society were discussed. Amongst others was the consideration of a proposal to hold the next annual meeting at either Macdonald College, P.Q., or the Experimental Farm at Ottawa. This was referred to the Executive Committee for further action. Dr. Bethune was elected a Life Member, in recognition of his services to the Society since its inception 47 years ago.

In the afternoon the proceedings began with the reading of reports by the Directors on the insects observed in their respective districts during the past season. No report was furnished by Mr. C. W. Nash, Director for District No. 4, East Toronto.

REPORTS ON INSECTS OF THE YEAR.

Division No. 1, Ottawa District—Arthur Gibson, Central Experimental Farm, Ottawa.

Throughout the Ottawa district, injurious insects were remarkably abundant during the season of 1910. Most of the regularly-occurring pests were present in greater numbers than usual. The season, on the whole, was much drier than that of 1909, the rainfall being below the average; July and August were particularly dry.

Attacking Field Crops.

The Hessian Fly (*Mayetiola destructor,* Say) was conspicuously present in wheat fields in the district. In 1909 no trace of it could be detected in fields where it did noticeable injury in 1908. During the past season large numbers of broken-down straws were seen in the middle of July, and all examined contained the well-known "flax seeds." In one plot on the Central Experimental Farm fully 10 per cent. of the plants were infested. The "flax seeds" were just above the first and second joints of the stems.

The Greater Wheat-stem Maggot (*Meromyza americana,* Fitch) again attacked many of the varieties of wheat in the plots on the Central Experimental Farm, but as in 1909, the infestation was not serious. The so-called "silver-tops," or "dead heads," were easily detected in July. The larvæ were full grown about the middle of the month. The insect was present in larger numbers in the varieties of Durum and Emmer wheats.

Cutworms. The Red-backed Cutworm (*Paragrotis ochrogaster,* Gn.) and the Greasy Cutworm (*Agrotis ypsilon,* Rott.) were responsible for much damage throughout the Ottawa district. Rows of young beets were entirely destroyed, radishes were freely attacked, and young cabbages and cauliflowers were cut off soon after planting out. In larger fields many mangels were rendered useless. The cutworms were present in particularly large numbers in the first week of June.

White Grubs were reported as doing some injury, especially to potatoes. A friend of mine, living at Meach Lake, lost many of his potatoes from the work of these larvæ, which ate into them, making large holes and rendering them useless.

Wireworms were also destructive in the district. On one farm, a few miles from Ottawa, land which had been in sod for many years was used for growing celery. Just recently the owner of the place mentioned to me that his celery plants had been practically all destroyed by the wireworms.

Some injury by the Clover Root-borer (*Hylastinus obscurus,* Marsh.) was observed on July 14th. At this time the larvæ were nearly full grown; at one place they had done a good deal of harm to Red Clover. The Green Clover Weevil (*Phytonomus nigrirostris,* Fab.) was also present in injurious numbers in the district. The work of the larvæ was very apparent towards the end of June. On 29th June some mature larvæ were collected; these spun their pretty little cocoons soon afterwards, and the beetles emerged on July 9th; at this date larvæ were still to be found.

The Turnip Flea Beetle (*Phyllotreta vittata,* Fab.) was noticed to be very abundant on young turnips and radishes, particularly the former, on May 27th. These small, very active, shining black beetles are responsible for much damage, but they can be controlled by dusting the plants with Paris green and flour, or Paris green and land plaster, one pound of the former to 20 lbs. of the latter.

Root Maggots. During the present year these very destructive insects have been extremely abundant in eastern Ontario. On the Central Experimental Farm the Radish or Cabbage Maggot destroyed radishes, cabbages and cauliflowers. Onions on the Farm were not attacked by the Onion Maggot, but in my own garden in the city about half of my onions were infested. The Corn-seed Maggot (*Phorbia fusciceps,* Zett.) did a good deal of injury to beans. In some fields examined towards the end of June, where pea beans had been planted, it was seen that the maggots first attacked the cotyledons, but as the plants grew and these were pushed up above the ground the maggots left them, and, in most plants examined, entered the stem, mostly near the roots. In some cases, however, the maggots had bur-

rowed down through the stem from the cotyledons. The important injury caused by this maggot, of course, is in the destruction of the primary shoot. Some white beans, which were planted near these pea beans, were not injured by the maggot. An interesting result obtained in our rearing of these maggots this season was the discovery that root maggots were not altogether responsible for the damage done. From infested radishes we also obtained, in early July, large numbers of the larger fly, *Muscina stabulans,* Fallen. A few specimens were also reared from pea beans. The food of *Muscina stabulans* is chiefly decaying vegetable matter, but it is known to attack growing vegetables. On the 14th October, mature larvæ and puparia of the Radish and Cabbage Maggot were found at the roots of cabbage plants.

Attacking Fruit Trees.

The Oyster-shell Scale (*Lepidosaphes ulmi,* L.) is very prevalent throughout the district. Apple trees are especially attacked. This autumn large numbers of the fruit bear many of the characteristic scales.

The Cherry and Pear Slug (*Eriocampa cerasi,* Peck.) has this year been again abundant around Ottawa. In September, many of the dull-coloured slimy larvæ were present on plum and cherry trees, as well as on mountain ash. This late brood seldom does serious damage. The foliage of some of the ornamental mountain ash trees on the Experimental Farm was conspicuously eaten, and when the skeletonized portions turned brownish the trees showed the attack very plainly.

The Apple-leaf Hopper (*Empoasca mali,* LeB.) was fairly abundant in apple orchards, and although it apparently did not do any very noticeable injury, its work could be easily seen on the leaves late in the season.

The American Tent Caterpillar (*Malacosoma americana,* Harr.) In spring and early summer many nests of this Tent Caterpillar were observed. The egg clusters were seen in the end of July to be very abundant, and for this reason we will most probably see next year a very much increased outbreak of the insect. Orchardists would do well to look for the nests of this caterpillar next spring, and as soon as they are noticed, cut them off and destroy them.

The Eye-spotted Bud-moth (*Tmetocera ocellana,* Schiff.). This well-known apple pest was abundant in the district the past season, and did much injury in some orchards. At Ottawa this year the larvæ were noticed to be almost full-grown on July 9th.

Other such well-known pests of the apple as the Codling Moth (*Carpocapsa pomonella,* L.), the Woolly Aphis of the Apple (*Schizoneura lanigera,* Hausm.), and the Apple Aphis (*Aphis mali,* Fab.) were, as usual, present in injurious numbers.

Attacking Forest and Shade Trees.

The Fall Webworm (*Hyphantria textor,* Harr.) was extremely numerous during the season. During my residence in Ottawa, since 1899, I have never seen so much injury by this well-known pest, as was done this year. Apple and wild cherry were the trees principally attacked; some of the smaller trees were entirely defoliated and rendered very unsightly by the many nests they bore. The work of this caterpillar was particularly noticeable in August. The Fall Webworm has been abundant this year all through eastern parts of Canada and the United States. In Maine, in the same month, I saw large numbers of the nests, dozens on a single tree. On July 6th I took from a raspberry bush near Ottawa a large nest, and by actual count it contained 318 larvæ. These varied in size from ⅛ of an inch to ¼ an inch in length.

The Spruce Bud-worm (*Tortrix fumiferana,* Clemens). In my report last year I mentioned an outbreak of this insect, which occurred particularly in the Upper Gatineau district, north of Ottawa. We had hoped that the outbreak of 1909 would not be repeated in 1910, but most unfortunately the insect was again present in enormous numbers during the past season, not only in the Upper Gatineau district, but throughout other areas in the Province of Quebec. In the immediate vicinity of Ottawa the larvæ could be found without difficulty on spruce trees, but they were not present near the city in numbers sufficient to do noticeable injury. At Ottawa, this year, many larvæ were mature in the first week in June, and specimens collected at that time produced the moths about two weeks later. On June 27 many empty chrysalides were seen on spruce trees on the grounds of the Central Experimental Farm. Female moths collected on July 16th deposited eggs on July 18, the larvæ hatching 7 days later. On July 23 thousands of the moths were present in store windows on Sparks Street.

The Larch Sawfly (*Nematus erichsonii,* Hartg.), is continuing its ravages all through the district. Many trees were seen which had been entirely defoliated. At Ottawa I found the clusters of the eggs on May 28 and at that time some of the young larvæ were just appearing.

Two other insects were very abundant on larches this year, viz., the Larch Case-bearer (*Coleophora laricella,* Hbn.), and the Woolly Larch Aphid (*Chermes strobilobius,* Kalt.) The Larch Case-bearer made its first appearance at Ottawa, as recorded by the late Dr. Fletcher, in 1905. Since then it has not been abundant until the present year. The attack this year was very apparent early in May. The moths began to emerge towards the end of that month. On June 15, moths were seen in numbers around the trees. This autumn the larvæ are plentiful on the trees, in their small incomplete cases. On May 27, the larches on the Central Experimental Farm were abundantly infested with the Woolly Larch Aphid. Clusters of the brownish eggs were found at the fascicles of the leaves on this date, and the young woolly aphids were scattered all over the leaves, the white woolly secretion being very conspicuous. The young were small and had only recently hatched. From one egg mass brought into the Division, some young emerged May 31.

The White-cedar Twig Borer (*Argyresthia thuiella,* Pack.) is this year again present in numbers throughout the district. It is not, however, as numerous as it was in 1905 and 1906. The tiny green larvæ of this species bore inside of the young tips of white cedar, causing the same to die, which injury, of course, is conspicuous and gives the trees a sickly appearance. The partly grown larva passes the winter within the twig where it has been working.

The Maple Phenacoccus (*Phenacoccus acericola,* King). On many of the trunks and lower branches of maple trees along the streets of Ottawa there are, at the present time, small, but conspicuous deposits of a cotton-like waxy secretion beneath which are colonies of this insect. Towards the end of September adult females, which are light yellow in colour and about one-fifth of an inch long, were found and large numbers of eggs. These latter were noticed to be hatching on Oct. 13. The young larvæ, which winter on the trees, were, on hatching, white with a yellowish tinge on the dorsum. As yet the trees are not seriously infested but the insect has increased abundantly this year and, as it is capable of doing important injury, if this continues, the trees may, of course, require some treatment. This is the first record of the Maple Phenacoccus occurring in the Ottawa district.

An interesting outbreak of the small Curculionid beetle, *Orchestes rufipes,* Lec., occurred locally on willow toward the end of May and during the first half of June. The beetles were first noticed on a large laurel-leaved willow, (*Salix pentandra,* L.), on the Experimental Farm, on May 31; four days later the beetles were more plentiful and by the 15th of June they were quite numerous and their work very noticeable. While the beetles did not do any serious injury their habit of eating small, round holes into the epidermis on the underside of the leaves, destroyed, of course, the beauty of the foliage to a marked degree. In one leaf, which measured 2¼ inches long by 1 inch wide, at its widest part, I counted 329 of these little holes. When standing beneath a tree and looking up among the foliage the work of this insect is very conspicuous.

The Butternut Tingis (*Corythuca arcuata,* Say.) At Chelsea, Que., Mr. Herbert Groh found a pretty little lace-bug in large numbers on butternut on June 20. The species answers to the description by Fitch of *C. arcuata* which appears in "Packard's Forest Insects." The species is known to occur also on birch, willow and other trees. The injury is done by the insects puncturing the leaves and sucking the juices.

The Pine Bark Aphid (*Chermes pinicorticis,* Fitch.) This insect is abundant on some white pine trees at the present time near Ottawa. The trunk of one large tree recently under observation is much infested with the aphid, and the patches of the flocculent downy matter give the trunk a very white appearance not unlike snow. A Syrphid larva is present in numbers feeding upon the aphides.

Plant Lice were extremely abundant on shade trees. The large green aphis on cut-leaved birches occurred in great numbers. In the middle of September the trees showed conspicuously the result of the attack. Manitoba maples were heavily infested with plant lice. The Elm Leaf Woolly Aphid was again injurious. The Snowball Aphis rendered unsightly the foliage of many beautiful Virburnums in gardens.

The Fall Cankerworm (*Anisopteryx pometaria,* Harris) was noticed in numbers on basswood and other trees. At the end of May the work of the larvæ was very apparent.

The Birch Leaf Skeletonizer (*Bucculatrix canadensisella,* Chamb.). The presence of this insect on cut-leaved birches was apparent in August and September; on September 16th some full-grown larvæ were seen. The small white pseudo-cocoons, which are made by the larvæ as temporary shelters during the time they are moulting, were conspicuous on the leaves.

Greenhouse and Flower Gardens.

Of the greenhouse insects which were specially troublesome in the district, the following may be briefly mentioned:

The Greenhouse Leaf-tyer (*Phlyctænia ferrugalis,* Hbn.) occurred in large numbers in the houses of one of our local florists; roses were chiefly attacked. In the same house, last month, a small black Thrip was doing considerable injury to the buds of roses. The White Fly is troublesome in some houses, attacking a large variety of plants; it was noticed to be working particularly on *Coleus* and *Primula.*

In flower gardens the worst insect of the year was the Tarnished Plant Bug (*Lygus pratensis,* L.). This insect does a tremendous amount of damage almost every year to all kinds of flowering plants. It takes a special delight in destroying the tender buds.

The Four-lined Leaf Bug (*Pœcilocapsus lineatus*, Fab.) was found destroying dahlias in July; it attacked the leaves and buds. Many of these insects, as well as of the Tarnished Plant Bug, can be destroyed by spraying the infested plants with either kerosene emulsion or whale-oil soap. They can also be jarred from the plants into an inverted umbrella and then put into a receptacle containing coal oil and water.

The Grape-vine Leaf-hopper (*Typhlocyba*) occurred abundantly the past season. Virginia creepers all through the city of Ottawa were severely infested, and before the middle of July much of the foliage had turned whitish in places, owing to the attack of the insect.

The Destructive Pea Aphis (*Nectarophora pisi*, Kalt.) was again present in the district, but was not particularly injurious. Small colonies were seen on field peas at the end of July, but later it was found in numbers on sweet peas in gardens. In my own garden, the parasite *Praon cerasaphis*, Fitch. did good service in reducing the numbers of the plant louse; the lady-bird beetles (*Hippodamia convergens*, Guer., *Adalia bipunctata*, L., and *Coccinella transversoguttata*, Fab.) were also present in fair numbers, feeding upon the aphis.

The Curled Rose Worm (*Emphytus cinctipes*, Nort.) was more than usually abundant, and infested roses could be seen in many gardens. The larvæ were particularly noticed in the middle of July, when they were about full-grown and when their work was easily detected. This is an extremely easy insect to control, and there is no reason why beautiful rose bushes should be rendered unsightly by the attacks of this false caterpillar. A weak Paris green mixture sprayed over the bushes will quickly destroy all the larvæ on the leaves.

Household Insects.

All of the worst household insects were present in Ottawa during the year. Cockroaches were complained of from many sources. The Buffalo Carpet Beetle was abundant in some houses, and caused a good deal of anxiety. Both of the two common Clothes Moths were especially numerous, and much havoc was wrought in houses where woollen clothing, furs, etc., had carelessly been left to hang in cupboards during the summer. A few weeks ago I saw a beautiful Persian lambskin coat, which had been practically destroyed by the larvæ of the Southern Clothes Moth (*Tineola biselliella*, Hum.). Although called the Southern Clothes Moth, this insect, unfortunately for us, does not confine its work of destruction to localities to the south of us. The Black Carpet Beetle (*Attagenus piceus*, Oliv.), during the winter of 1909-1910, was present in destructive numbers. In one instance, that came under my notice, these insects did serious injury. In two cupboards, the contents of which had not been examined for some months, damage was done to woollen goods, and also to a beaver collar of a fur-lined coat. Larvæ noticed in the early part of April were from 6 to 10 mm. in length.

Division No. 5, Port Hope District—F. J. A. Morris, Port Hope.

Owing to prolonged absence I have had little opportunity of direct observations. At the end of September I interviewed a young farmer east of the town, whose orchards two or three seasons ago were badly infested with the Oyster-shell Bark-louse. He tells me that the pest has almost entirely disappeared in the neighbourhood; and this good result he believes is due to careful cleaning and spraying under advice from the Agricultural Department.

Mr. Hume, a well-known seedsman in Port Hope, who is a large grower of peas, informs me that a greenish black louse (presumably *Nectarophora destructor*) has been abundant this year, far more so than he has ever found it before; he thought that it was most prevalent just after damp spells in the hottest part of the season; this would be rather contrary to the habit of most plant lice which multiply in dry seasons. The insect had destroyed a great many of his pea-vines.

The larva of the Saw-fly (*Selandria cerasi*) has been abundant in our neighbourhood this season, and has completely destroyed the foliage of some trees. Mr. Mitchell, of the Ontario Gardens, had some young pear trees stripped; a neighbour some cherry trees; and in one orchard the larva was found prevalent on plum trees, as well as cherry and pear. The damage in all cases was done by the later brood at the end of August and in September.

The larva of *Rhagoletis pomonella* (the Apple Maggot) has been quite a severe pest in our neighbourhood, chiefly affecting the early apples; a great many of the apples that ripen in September were attacked by this fly, and the fruit fell to the ground spoiled. In the east section of Port Hope the apple-pickers complain of the damage done by the "Railroad Worm," or by some disease that turns the flesh of the apple to a woody consistency and causes the fruit to develop irregularly; on the outside the apple has a gnarled and deformed appearance. This does not appear to be caused by an insect, though one apple-picker assured me that "the railroad worm" was not a grub, but a name given to the green fibrous thread that sometimes showed in the flesh of the apple where it had turned woody. In some orchards the entire crop was ruined; in all the affected area the apples that were gathered were marked second grade. It was first noticed in Snow apples, but Talmon Sweets were also affected, and the worst sufferers were Spies.

The day after returning to Port Hope I examined a large field of asparagus north of the town, and found both species of asparagus beetle fairly abundant; it was three years ago that I first found *Crioceris 12-punctatus* so far east, and this season of 1910 is the first in which the other species (*C. asparagi*) has come under my notice. The spotted kind was more abundant than the more recent arrival in the neighbourhood. I examined two other asparagus beds, east and north-east of the town; in each case the two species were present. Larvæ as well as beetles were observed in the foliage as late as the 20th of September. They do not appear to do much harm to the full grown plant, and there was little sign of the spring brood having wrought havoc; the asparagus rows appeared well filled, as though few heads had been destroyed at the beginning of the season.

To turn from economics, some remarkable gatherings of butterflies were noticed this year; Mr. Mitchell, of the Ontario Gardens, saw great masses of a yellow butterfly along the road sides while driving through the country. This was doubtless one of the Clouded Yellows (*Colias philodice*). In August, too, were noticed in two or three parts near Port Hope, millions of the Milkweed Butterfly (*Anosia plexippus*). In one case a small beech wood was filled with swarms of this butterfly, so that the branches of the trees appeared as if covered with brown foliage; if a stick was thrown up, myriads of the insects rose into the air and settled down again.

In the order Coleoptera, nothing new was taken by myself, and Dr. Watson, my fellow-collector, noticed nothing much that was unusual in our collecting grounds, though few of our old friends about the blossoms and foliage failed to return to their haunts as usual. On June 26th were captured one or two specimens of *Acmæops proteus* settling on a pine trunk: and between that date and July 13th were taken some five or six specimens of *Neoclytus erythrocephalus* on the trunk

of a felled oak. From the latter date till August 7 were found some specimens of *Leptostylus* resorting to a pile of oak billets at the same spot; they appeared to be about to oviposit between the bark and the wood at the ends of the billets, probably attracted by the smell of fermenting sap. Two species of *Oberea* were captured between June 26 and July 13, one feeding in dogwood blossom, the other resting on raspberry foliage. About raspberry foliage, too, as well as about basswood leaves there were more specimens of *Agrilus* than usual seen, mostly of two species, *ruficollis* and *anxius*.

Among Hymenoptera, the Horn-tails seem to have been active on the young elms bordering some of our residential streets; I found in October as many as three females of *Tremex columba* imprisoned in the bark of one young elm.

Division No. 2, Orillia District—C. E. Grant.

The season of 1910 was again, like 1909, very cold and late in spring, the warmest weather 73° in the shade occurred in March, in which month the temperature was over 70° on three different occasions (though we did not have much warm weather until near the middle of June), and several species of moths were taken by me at light in March, an unusual occurrence here.

Injurious insects were not remarkably plentiful. Complaints were made of the turnip-root maggot, in fact late sown turnips were almost a failure from the depredations of this insect. The Raspberry Cane-Girdler (*Oberea bimaculata*) was noticeably abundant; in some gardens the broken tops of the canes looked as if someone had been going through the patch with a stick. The apple crop was almost a failure here; I have reason to suppose that it was caused by the very wet weather which occurred during the time the trees were in blossom, and in consequence the bees had no chance to carry the pollen for fertilization. *Carpocapsa pomonella* should be rare next year if scarcity of food lessens their numbers.

Canker Worms were very common here this spring; the moth of these and of *Erannis tiliaria* are in great numbers around my lamp as I write this, October 25.

Nematus ribesii, the Currant Worm, was very prevalent, and the first brood coming in the wet season of this year made it almost impossible to keep any insecticide on the plants long enough to check their ravages.

On a hedge of hawthorn a species of Schizoneura was so plentiful that the trees appeared as if they had been whitewashed. On examination it closely resembled the alder louse, on which *Feniseca tarquinius* feeds.

During a wind storm in July a large quantity of maple trees, or large limbs of the same, were broken. This occurred particularly in two or three localities where the trees were full of the burrows of the Pigeon Tremex (*Tremex columba*), and many of the grubs and even parts of the perfect insect were present; there seemed to be no other reason for their rotten appearance except what might be from heavy top pruning. I have taken some moths this season which are rare to me, viz., *Fentonia martesia, Elida caniplaga, Notodonta simplaria, Plusia oxygramma, Syneda Alleni*, etc.

Division No. 6, Galt District—R. S. Hamilton.

The weather conditions in this district during the past spring and summer have not been favourable for insect life, and as a consequence fruit growers, nurserymen and the farming community in general have had little to contend against in the way of insect pests.

It is rather remarkable that plant lice, which were responsible for considerable damage in the orchard and field in 1909, were scarcely in evidence this season. The same is true of the cutworms and the codling moth.

Slight exceptions to the general freedom from insect pests were the Colorado potato beetles, which were unusually abundant. Some complaint was also made of the ravages of the Canker-worm (*Paleacrita vernata*), which did some injury to the beech, maple and apple trees. Maple trees in Galt and vicinity have been attacked by the Pigeon Tremex (*Tremex columba*), but investigation showed that no very serious injury has been done.

Division No. 3, Toronto District—J. B. Williams, Toronto.

I have been away in England most of the summer; so that the only matter on which I can report anything is the well-worn subject of the Tussock Moth.

These insects have been very numerous in Toronto during the past summer, and I have noticed quite a large number of trees that have been seriously damaged by them, nothing being left on large portions of the foliage, except the veins of the leaves.

Our Park Commissioner obtained, this autumn, a grant of $3,500 for the purpose of collecting the egg masses of the cocoons; and, I believe, he is employing three gangs of men in this work as long as the fund lasts; but the egg masses must be more generally collected in the private grounds and gardens of the city if the work is to be really successful.

Great numbers of the cocoons this year were found on two apple trees in the garden of the house where I live, though there were no signs that the caterpillars had been feeding on the leaves of these trees. I picked a large handful of the egg masses off them a few days ago; and so did a little towards the destruction of this troublesome pest.

Division No. 7, Niagara District—R. C. Treherne.

I have the honour to present my first report as representative for the Niagara District.

I regret to say that my report must be lacking in detail, for the reason that I have been absent from the district for a greater part of the summer, consequently I am compiling this report with the assistance of friends residing in the district and from a few notes I had in hand previous to leaving the district.

The fruit-growers of the Niagara district are still greatly troubled by several very serious insect pests. There are four insects which are present every year, and which, I regretfully have to believe, are yearly increasing over a larger area. These four are—

1. The Codling Moth (*Carpocapsa pomonella*).
2. The Plum Curculio (*Conotrachelus nenuphar*).
3. The San Jose Scale (*Aspidiotus perniciosus*).
4. Shot Hole Borer (*Scolytus rugulosus*).

In none of these cases am I able to give figures or statistics, showing effects of spraying or degrees of infestation. I can merely mention them as being the most serious pests with which the fruit-grower has to contend.

The Codling Moth has been more than ever abundant this year, especially so in unsprayed orchards. Even in cases where orchards have been sprayed at the

correct time and with the right mixtures two or three times during the summer, the results have been disappointing. In orchards where the trees are attended to several years in succession satisfying results with sprays have been obtained, thus demonstrating that combined and continued attack on this insect results in success.

The Plum Curculio during this last summer has been more plentiful than usual, at least not perhaps in point of numbers, but in comparison with the fruit crop, which has been light. The early spring and blossoming period was cold and wet, and it was hoped that these climatic conditions, while reducing the fruit yield, would also affect the numbers of this insect. Later reports show, however, that it was as much in evidence as usual, if anything, attacking a larger proportion of the fruit crop.

This insect attacks a variety of fruits, and the members of the Entomological Society should be urged to regard this insect with more attention. More observations are needed on the best time to spray. It is considered best to use an insoluble poison in a spray and to coat the leaves and the small developing fruits with it. But whether to spray early or late is the point to be determined. If spray is applied too early the calyx cup protects the young plum and when, in course of a few days, the calyx cup drops off, the plum is left clean and free for attack.

The San José Scale is steadily increasing, despite the greater number of men who are spraying, and if my information is correct, spreading to new orchards. I saw an excellent result of a spraying with lime sulphur (commercial) on a tree well encrusted.

The Shot Hole Borer is well on the level with the above insects in the matter of destructibility. We have no definite practical means of fighting it, and its attack usually means death to the tree. Such injury cannot be said of the other insects which we can fight with a more reasonable hope of success. The destruction of worthless trees and the cleaning up of lumber piles and fence corners cannot be too strongly advised.

There are other insects which have been more or less plentiful this year. The Pear Tree Slug (*Eriocampa cerasi*) has been particularly abundant on young cherry trees throughout the entire district. The Currant Aphis (*Myzus ribis*), an insect causing currant leaves to discolour and fall prematurely, has been commonly seen. The Snowy Tree Cricket (*Œcanthus niveus*) has been more abundant than usual attacking in particular the raspberry. The Grape Berry Worm is reported from St. Catharines vineyards. Aphids common to the apple, which were reported in numbers last year, were present in considerably reduced numbers this year. The Woolly Aphis (*Schizoneura lanigera*), considered to be one of the worst pests of the apple in more temperate climes, is fortunately by no means abundant in the Niagara District. It is present, however, throughout the entire district, making itself shown in pruning scars and cracks and crevices of the bark. Its numbers are very small, but perhaps 25 per cent. of the apple trees of the district harbour, to a greater or lesser extent, a few of these insects. My observations, in this regard, only extend over comparatively few orchards.

One other insect might be mentioned as causing considerable annoyance to certain fruit-growers who were planting out sweet cherry trees this spring. It is a species of wood-boring wasp, the name of which has not yet been determined. This spring, on my own farm, I had occasion to set out upwards of 500 sweet cherries of various varieties. After they had taken a fair hold of the ground I pruned them, leaving merely a straight stem standing. The central portion of the stem is soft and pithy, and it is not for several weeks after pruning that the

exposed surface hardens. One day, going over these trees, I noticed small, round holes bored down the soft, central pith and some castings of wood on the leaves below. Over 300 of my 500 trees were attacked in this way, the holes extending down the stem upwards of three inches. Stored snugly and tightly in some of these holes were numerous aphids. The cause of this injury was, apparently, one of the wood-boring wasps. Adults were captured and taken to Ottawa for identification.*

I heard of two other cases, within a radius of three miles of Grimsby, in which young cherry trees were attacked, and while the injury was not serious, it was distinctly annoying to have to rehead your trees. I punched out the aphids and filled the holes with a lime and lead arsenate paste as remedies.

I have to thank Messrs. Tennyson D. Jarvis and Wilfred Ryan for their assistance in this report, and also Dr. C. Gordon Hewitt, Dominion Entomologist, who has kindly allowed me to incorporate a few notes, which were obtained under his authority.

Insects of the Year in Ontario—Lawson Caesar, B.A.; B.S.A., Ontario Agricultural College, Guelph.

Orchard Insects—Codling Moth (*Carpocapsa pomonella*). The apple crop was very light this year and, as usually happens in such cases, a large percentage of the fruit was wormy. Many would place the amount of damage in unsprayed orchards at 50 per cent. of the total crop; it will probably be safe to estimate it at at least 40 per cent. Much more spraying than usual was done and fruit-growers are gradually learning that to get the best results they must do the work not only at the right time, but also very thoroughly. In every case very satisfactory results have followed good work; in fact it is a long time since the benefits of spraying were so clearly demonstrated. This is partly because the season was so favourable to the development of Apple Scab that only in sprayed orchards in many districts could any clean fruit be purchased.

Lesser Apple Worm (*Enarmonia prunivora*), Plate A, Fig. 1. While probably not more than 2 to 5 per cent. of the wormy apples of the Province could be attributed to attacks of the Lesser Apple Worm, individual orchards were discovered where the percentage was much higher. For instance, in one orchard near Guelph, fruit on the ground in October showed that 38 injuries out of a total of 80 had been caused by this insect; the rest were due to Codling Moth. Fruit purchased on the market from farmers in the vicinity of Guelph showed a considerable number of Lesser Apple Worm injuries. It is easy to find the larvæ in haws in this district up to almost the end of October. Specimens for class study each year are obtained from this source. The same spray as for Codling Moth seems to control this pest fairly well. It is just probable, however, that an additional spray with arsenate of lead about the first week in August would help greatly.

Plum Curculio (*Conotrachelus nenuphar*), Plate A, Fig. 2 (p. 7). Observations the last two years in various parts of the Province show that the damage to apples from the fall feeding of the new adults is very great in many districts. Wherever orchards are neglected or are situated near good hiding-places for winter quarters, such as woods, a large percentage of the apples, especially of the rougher skinned varieties, are rendered unsaleable by feeding punctures made from about the middle of August up into October. Thorough cultivation of the soil and the

* This insect, through the kindness of Dr. L. O. Howard, of the Bureau of Entomology, Washington, has been determined by Mr. S. A. Rohwer as *Cemonus inornatus* Say.

removal of rubbish of every kind has been observed in many cases to be quite as important as spraying in controlling this pest.

MR. GIBSON: What is the largest hole you found?

MR. CAESAR: There are often several small holes close together which may be worked into one large hole. The injured area is usually from 1/8 to 1/4 of an inch. in diameter, and quite circular.

DR. HEWITT: We have had a number of cases of where the holes are large. In some cases I think wasps have been responsible for the enlargement.

APPLE MAGGOT or RAILROAD WORM (*Rhagoletis pomonella*). It has usually been supposed that this insect was found only in Prince Edward County and in a few orchards not far away on the mainland. In reality it is much more extensively distributed than has been suspected, and can probably be found here and there throughout most of the Province, though there are many orchards quite free from it. Infested apples have either been sent in from the following counties, or have personally been observed by the writer in them: Prince Edward, Hastings, Northumberland, Durham, Ontario and Lincoln. The insect seems to be worse on trees in villages or towns, wherever there is good shelter. In such places it has been seen to be very severe on Spy, Snow, Alexander and Tolman Sweet varieties, almost every apple being so badly attacked as to be much deformed and useless. Adults did not appear until July 15th this year east of Toronto. Methods of control in co-operation with the fruit-growers are being planned for the coming season. At present the prompt destruction of fallen fruit from August 1st to the end of the season is the remedy commonly advocated.

MR. NASH: We have found as yet that the only method of control is absolutely rigid destruction of the fallen fruit.

MR. CAESAR: Has it been proven that the larvæ never emerge from the fruit before it falls?

MR. SWAINE: The evidence points that way.

MR. CAESAR: Have all the maggots come out after the apples have fallen in your tests?

MR. SWAINE: I do not think any come out till then. Sometimes the maggots are very small, but I have always had the impression that they did not come out until a short time after the apples drop, but I am not certain about it.

MR. CAESAR: I have seen a number of cases this year that seem to me to make that doubtful.

MR. JARVIS: Have you made sure it was the Apple Maggot in the Niagara district?

MR. CAESAR: The external injury and the appearance of the larva itself corresponded so exactly with the genuine thing that I have no doubt that it was the Apple Maggot I found in that district.

DR. HEWITT: The way to breed them is to get apples that have just fallen and put them in a box containing soil, and allow the maggots to come out.

MR. CAESAR: I saw, I suppose, one hundred in Michigan that had changed to pupæ even without any soil. They came out of apples that had been placed in a vessel for another purpose. This merely shows how readily they change to the pupal stage.

MR. HOWITT: Do the apples always fall when attacked?

MR. CAESAR: They often remain on the trees until quite late. Some Tolman Sweets that are attacked might be still found on the trees, but as a rule they fall earlier than they otherwise would.

DR. HEWITT: They ripen prematurely.

Mr. Caesar: I have seen some orchards where Spies nearly all fell two or three weeks prematurely.

Dr. Hewitt: I could give you a practical illustration in regard to control by destruction of the fruit. One of the most serious places for the Apple Maggot has been in the orchards around Como, in Quebec, and Mr. Shepherd told me that he had cleared them out of his own orchard by destroying the fallen fruit.

Mr. Swaine: That case is the standard one quoted for the Apple Maggot all over the northern part of Eastern United States.

Mr. Caesar: I was aware of Mr. Shepherd's experience, and was much interested in it.

Mr. Swaine: He was particularly careful in his work.

Aphids of the Orchard.

These insects were not nearly so abundant this year as last, and only in a few cases were there any complaints of damage. Our most common species of green apple aphis is evidently *Aphis avenæ,* Fab. In a few orchards specimens of a rosy aphis, probably *Aphis pyri,* Boyer, were seen. On the sweet cherry the Black Aphis (*Myzus cerasi,* Fab.) was fairly abundant in the early part of the season, and caused considerable loss.

The Woolly Aphis (*Schizoneura lanigera*) was rather more abundant than usual. So far as I know this pest does not attack the roots to any appreciable extent. On the branches it can easily be destroyed by a spray of kerosene emulsion forcibly applied.

Mr. Caesar: Have you got the Rosy Apple Aphis at Montreal, Mr. Swaine?

Mr. Swaine: It is fairly abundant this fall.

Dr. Hewitt: *Aphis sorbi* is quite abundant in the West.

Mr. Caesar: What is your common green aphis on the apple?

Mr. Swaine: *Aphis pomi* (DeGeer).

Oyster-shell Scale (*Lepidosaphes ulmi*). This pest is rapidly being brought into subjection in all the best apple districts by the use of the lime-sulphur wash. This spray is rapidly displacing all others for this purpose, and wherever it is continued year after year it completely frees the orchard from the scale.

San José Scale (*Aspidiotus perniciosus*). Though specimens of San José Scale have been sent in this year from Northumberland County and last year from Prince Edward County, it is still doubtful whether it is capable of establishing itself firmly in these colder districts. Lime-sulphur is the standard remedy.

Blister Mite (*Eriophyes pyri*). This mite is now to be found in almost every district in the Province, although many orchards here and there are still exempt. It may prove a blessing in disguise, as it will in many cases force the farmer to spray his trees rather than let them look so unsightly and be so greatly injured. Lime-sulphur applied just as the buds are bursting has given very satisfactory results both last year and this.

Mr. Jarvis: Do you think it has spread so rapidly, or are people just opening their eyes and noticing it?

Mr. Caesar: In my brother's orchard there were only two pear trees, on which this had evidently been brought in. Those two trees two years ago were completely infested. To-day almost every tree in the whole orchard is attacked.

Mr. Jarvis: Five or six years ago I found it nearly everywhere in the Province.

Mr. Caesar: The fruit-growers tell me that in orchards where they are not spraying with lime-sulphur it has been spreading very rapidly. It certainly is all

over the Province, though not in every orchard, by any means, but in every district.

Mr. Gibson: Dr. Fletcher used to say that where you can find a pear tree you will find a Blister Mite all over Canada.

Mr. Caesar: It is probably found now more on the apple than on the pear.

Anametis Grisea. Specimens of this Snout Beetle and of apple leaves injured by it were sent this year from Albury, Prince Edward County, and Grafton, Northumberland County. In the latter place it was suspected also of feeding on the bark of apple twigs. The beetles are nocturnal in their habits, so far as could be learned. In the day time they hide under loose bark on the tree. Specimens of injured leaves obtained at Albury, early in July, showed that they fed around the margin, causing it to become very jagged.

Pear Psylla (*Psylla pyricola*). It is several years since this tiny pest has been so abundant in the Niagara district as this year. In many cases the spring application of lime-sulphur should have been supplemented by the use of kerosene emulsion soon after the leaves had opened.

Pear and Cherry Slug (*Eriocampoides limacina*), Plate B, Fig. 5. Neglect to control this pest has led to its becoming exceedingly abundant the last two years. Many otherwise good cherry orchards have been rendered unsightly by the feeding of the slugs on the leaves. Young trees are most subject to attack, and are usually the ones most likely to be overlooked until the damage has been done. Plum trees were attacked in some places, as well as sweet and sour cherries and pears. Arsenate of lead readily controls the insect.

Cherry Fruit Fly (*Rhagoletis cingulata*), Plate A, Figs. 3 and 4. When the sour cherries were ripening I paid a visit to an orchard near Homer village, where it was said some grub, evidently not that of the Plum Curculio, was to be found in the cherries. As was suspected, the culprit proved to be the Cherry Fruit Fly. Many adults, chiefly males, were seen on the leaves and fruit, and not a few of them were captured with comparative ease. On examining the ripe fruit, maggots, very like those of the Railroad Worm, were found inside, some of them nearly or quite full grown. A few wormy cherries were brought back and put in a breeding cage. On examination of the soil in the autumn eight puparia were found about one inch below the surface. No experiments on control have been tried yet, but evidently care should be taken to gather all the fruit, so that none of it may fall to the ground and give the larvæ a chance to escape into the soil. All wild cherry trees in the neighbourhood should be cut down and burned, as these doubtless serve as breeding quarters. Discing the orchard and allowing chickens to run in it should be very helpful. Prof. Pettit, of Michigan, tells me that in that State the pest seems to disappear almost entirely from time to time. This is encouraging news, if it be true of Ontario as well as of Michigan.

Mr. Caesar: Does anyone know of any other district where this pest occurs?

Mr. Swaine: I have not heard of it down our way.

Mr. Howitt: It is in New York State, especially on cherries which have gone wild on the roadsides.

Fruit Bark-beetles (*Eccoptogaster rugulosus* and *Phleotribus liminaris*). These troublesome little beetles are not nearly so abundant as they were a few years ago. This apparently is to be attributed chiefly to the numerous parasites which are found to be attacking them. There are clearly two broods of *E. rugulosus*, the adults of the first appearing about the middle of June, and of the later brood about the middle of August. This species is much more common than *P. liminaris*.

Mr. Jones has discovered that *E. rugulosus* is frequently the cause of the spread of the Pear Blight germs (*Bacillus amylovorus*). The best means of control is clearly the destruction by fire of all dead and dying branches, and of all old brush heaps early in spring. If any trees are seen to be attacked during July they should be burned shortly before the end of the first week in August, to destroy the larvæ and pupæ. After this date it is better to leave dying or attacked trees in the orchard to act as traps and entice the beetles from healthy trees. Those thus left should, of course, be destroyed next spring early.

The Blackberry Leaf-miner (*Metallus* (*Scolioneura*) *rubi*). This sawfly larva has spread over most of the Province, and in some districts has done much damage to blackberries by mining in the leaves; sometimes almost every leaf is severely attacked by one or more larvæ. This year the adults appeared in the Niagara district by about July 1st, and egg-laying at once began, the eggs being placed, so far as I could observe, just under the epidermis, and not being visible externally. When full grown the larvæ enter the earth. There are almost certainly two broods each year, living larvæ of the last being found in the leaves as late as November 16th last year. The winter is passed in the larval (not pupal) stage in tiny oval earthen cases, about one inch below the surface of the ground. (Apparently this point has not been observed before.) These earthen cases are not held together with silk, but with some mucilaginous substance. Sometimes they seem to be hard to break open, and sometimes easy. Kerosene emulsion was tested on the leaves, but was clearly useless, as it could not penetrate through the epidermis, even though this was dead. The only remedy that seems practicable where the pest is severe is to stir the soil frequently with a hoe around the base of the plants very late in autumn and in spring up to July, so as to break the cases and destroy the larvæ or pupæ inside. If there are only a few leaves attacked these can be either pulled off towards the end of July or the larvæ crushed inside with the fingers, using a leather glove to protect against the thorns.

Raspberry Sawfly (*Monophadnoides rubi*). The larvæ of this sawfly were more abundant than usual. Arsenate of lead should easily control them.

Wireworms and White Grubs. The cold, late spring retarding the growth of grain after it came through the ground seemed to give Wireworms and White Grubs a chance to do much more damage than usual. During the farmers' excursions in June I was almost constantly being asked for information on how to combat these pests. About all the remedy I could give was the old-time one of fall ploughing and rotation of crops. On enquiries I found that only in a very few cases were peas attacked. Frequently where peas and barley were sown together, the barley was destroyed and the peas left. This experience could be made use of by farmers where they feared attacks from Wireworms if they sowed oats or barley. I recommended that the new remedy originated by Prof. Fernald for preventing Wireworms from attacking seed corn be tried on a limited scale. Prof Fernald puts tar on the seed in the manner practised to keep off crows, then, to dry it so that it will go through the seeder, he places it in a large bucket containing fine dust and Paris green mixed in such proportions that the corn, after being shaken up in the bucket, shows a greenish color. The corn in his two years' experiments never failed to germinate and was quite uninjured by the Wireworms, which, he thinks, were probably repelled by the covering substance rather than killed by it.

Mr. Nash: Prof. Slingerland investigated a number of remedies and found that they were of no use.

Mr. Caesar: Yes, but he did not use the tar and Paris green combined in this way.

Mr. Nash: You can understand that it will not act as a preventive, because the Wireworms will eat off the rootlets as quickly as formed.

Mr. Caesar: The Wireworms attacking the kernels have been in this way a great pest, and never give the corn a chance at all.

Mr. Nash: It does not seem at all practicable.

Dr. Hewitt: It protects the kernel, but will not protect the roots of the plant.

Mr. Caesar: Possibly the odor of the tar has something to do as a repellant.

Mr. Nash: We know quite well that the tarred seed does not protect the plant at all.

Mr. Caesar: Prof. Fernald has been working on this for two years, and he claims that he has got excellent results. I was reading the other day results from further trials, and the writers claim that they did not care how badly the field was infested the corn would not be attacked if treated with the tar and Paris green. As for Prof. Fernald, it is well known that he is a thorough man in his work.

Mr. Nash: They got hold of a susceptible breed of Wireworms.

Mr. Howitt: Have you found the Wireworm attacking potatoes to any extent? I came across a district around London where about 30 per cent. of the potatoes were bored through with the Wireworms.

Mr. Caesar: Yes, quite often. Have you known of the above method of controlling them, Mr. Swaine?

Mr. Swaine: I have known it to be reported upon favorably a number of times.

Pea Aphis (*Nectarophora destructor*). This very serious pest was only found locally, but in a few districts it destroyed whole fields of peas. One farmer thinks its presence on the vines has led to the death of some of his cattle by poisoning. This scarcely seems possible.

Root Maggots (*Pegomya brassicæ* and *P. cepetorum*). These troublesome pests have been about as abundant as usual. Late cabbage has been almost free from them.

Cabbage Aphis (*Aphis brassicæ*). Fortunately this species of insect is at last being brought under control by its natural foes, and this year in most parts of the Province did comparatively little damage.

Spruce Galls (*Chermes sp.*) Plate B, Figs. 6 and 7. Some attention has been given to spruce galls this year, chiefly by my summer assistant, Mr. W. A. Ross. It has been found so far that we have on spruce in the Province, *Chermes abietis, C. similis, C. pinifoliæ,* and a species that seems to be *C. pinicorticis,* but was not studied early enough in the season to get the adults, and so make sure of its identity. Of these, *Chermes abietis* is the most abundant, and is found on Norway, Black and White Spruce. *Chermes similis* is very abundant on White Spruce, and is doing much damage. *Chermes pinifoliæ* has been found by us only at Port Hope, where I saw it on one tree, which I think was White Spruce, although it might possibly have been Black. Experiments on the control of *C. abietis* showed that because of its exposed condition it could be destroyed by an application of whale-oil soap or lime-sulphur in April. Excellent results have been obtained from the latter, both this year and last.

So far we do not know when *C. similis* can be best attacked. It looks as though it would be a much harder species to combat than *C. abietis.* In spring it is so enveloped in a flocculent mass that lime-sulphur has no effect on it, and probably an oil spray would likewise be ineffective.

Dr. Walker: Did you say you found *Chermes pinifoliæ* on the White Spruce?

Mr. Caesar: I have been looking for it wherever I have gone, and only found it in Port Hope.

Dr. Walker: I have seen it at Nipigon, on the north shore of Lake Superior, confined to a single tree, and had to hunt a good deal to find as many as eight or ten specimens. I took it to be *C. pinifoliæ,* but may be mistaken. I think it was also this species that was sent to me from Snelgrove. I have found *C. similis* only on White and Black Spruce, never on Norway.

Mr. Jarvis: There is a species very common in the far west; it is about half an inch in length. Do you know that one?

Dr. Hewitt: I have collected that same one all through Saskatchewan, Alberta and British Columbia this fall. It seems to be a more compact and more regular species. I have got here about six different species of *Chermes.* The box has been arranged for me by Miss Patch. I find that *floccus* and *similis* are far more common than heretofore supposed. *Floccus,* I think, occurred in Quebec this year, too.

Mr. Caesar: We have not found *C. floccus* in Ontario yet.

THE MORE INJURIOUS INSECTS IN CANADA DURING THE YEAR 1910.

C. Gordon Hewitt, D.Sc., Dominion Entomologist, Ottawa.

As reference has already been made by the directors of the various districts in eastern Canada, and by Mr. Caesar, to those insects which have been brought to their notice as being more or less prevalent and injurious, it remains for me to briefly mention those insects which have occurred in other parts of Canada, or whose injuries have been more than usually serious.

In the northern districts of Saskatchewan considerable damage has been caused by the Red-backed Cutworm (*Paragrotis ochrogaster,* Gn.), the injuries being chiefly to wheat. Another cereal pest, especially upon oats, which seems to be spreading is a species of Thrips. Oats which had been injured by this insect were received from Quebec, Saskatchewan, Alberta and British Columbia. It produces a characteristic whitened appearance of the ears.

The Western Blister Beetle (*Cantharis nuttalli,* Say) was very abundant in the western provinces of Manitoba, Saskatchewan and Alberta, where it was reported as injuring chiefly peas.

The Potato Beetle (*Leptinotarsa decemlineata,* Say) is gradually working its way north in Alberta, its northern limit at present being somewhere in the neighborhood of Edmonton.

The Hop Flea-beetle (*Psylliodes punctulata,* Melsh.) was again serious in British Columbia, but on some of the ranches the Red Spider was a much more serious pest. The manager of one hop yard stated that it was compelling them to cease growing hops. In one locality, where a crop of six or seven hundred pounds of hops to the acre is usually produced, they were reduced to two hundred pounds to the acre by the ravages of the spider, and the resulting hops were of very poor quality. The destruction of the mite wintering in the hop poles would appear to be the best method of controlling it, as they were found there in large numbers. This can be accomplished by dipping the poles in a caustic solution, such as lye, or in coal oil.

One of our most serious pests in Canada at present is the Brown-tail Moth, now established in Nova Scotia. During the last summer we have also received the first record of its breeding in New Brunswick, a single egg mass having been found at St. Stephen, N.B. This was not surprising nor unexpected, in fact it is singular that it has not been found breeding in numbers in that locality before, in view of the fact that it extends along the coast of Maine as far north as the Ste. Croix River. In July a visit was made to the eastern States, for the purpose of studying the distribution of the Gipsy and Brown-tail Moths, and the means that were being taken to control them and to prevent their spread. One object of this visit was to ascertain to what extent nursery stock and other vegetation shipped from these States into Canada was liable to be infested with these two insects: on account of the conditions which prevailed a regulation was passed under the new Destructive Insect and Pest Act, providing that all nursery stock from the six eastern States: Connecticut, Rhode Island, Massachusetts, Maine, New Hampshire and Vermont shall be inspected at the point of destination. Reference may be made here to the passing of the "Destructive Insect and Pest Act" during the last session of Parliament. With the Brown-tail Moth and the San José Scale already within our borders there was urgent need for legislation which would enable the Federal Department of Agriculture to take such measures as would insure, so far as is humanly possible, the freedom of nursery stock and other vegetation from serious pests which are liable to enter Canada by such means. It was also necessary for the Minister of Agriculture to be empowered to carry out such eradicative measures as shall be considered necessary to combat those insects which have already established themselves in the country. Briefly, then, the new Act provides for the fumigation of imported stock when it is necessary for the San Jose Scale, the inspection of European and certain other classes of imported stock for Brown-tail and Gipsy Moths, the carrying on of such work as shall be necessary for the eradication of those pests scheduled and the compulsory treatment on the part of the owners of trees and other vegetation infested. The insects at present scheduled are the San Jose Scale, the Brown-tail and Gipsy Moths, the West Indian Peach Scale and the Woolly Aphis. Armed with this machinery we hope to be able to fight against the introduction of those pests to which Canada, as a rapidly-developing country, is specially subject. Reverting to the Brown-tail Moth, the result of the last season's inspection in Nova Scotia would indicate that, although in certain localities the winter webs were numerous, on the whole the area infested was more restricted, thanks to the energetic action of Prof. Cumming, the Secretary for Agriculture for Nova Scotia. During the coming winter season we intend to co-operate with the Provincial Government and carry on an active campaign. It was interesting to find that the only batch of eggs discovered in New Brunswick was parasitised by a small egg parasite, apparently a species of *Trichogramma*.

Another alien which, unfortunately, has been added to our gradually increasing fauna of injurious insects, is the Narcissus Fly (*Merodon equestris*, Fab.). This was reported from Victoria, B.C., and during my recent visit to the district I had the opportunity of looking into the matter. It was probably introduced on Dutch bulbs. The fly somewhat resembles the Drone Fly, belonging to the same family, the Syrphidæ, and the maggot feeds in the centre of the bulb, thereby causing its death. The bulb-grower who reported this insect to the Division of Entomology had about 50,000 bulbs of narcissus and daffodils destroyed last year by the fly. On account of the habits of the larvæ it is difficult to devise effectual preventive or eradicative measures; some benefit resulted from spraying with an arsenical. Further details of the life-history and habits of the fly in Canada must be elucidated before measures can be suggested.

Last year Mr. Gibson called the Society's attention to the outbreak of the Spruce Bud-worm (*Tortrix fumiferana,* Clem.), which had been reported to the Division of Entomology as causing serious defoliation of the spruce and balsam trees in the Province of Quebec, about 100 miles north of Ottawa. During my visit to British Columbia, in October of last year, it was found to be defoliating the Douglas fir on Vancouver Island, and when that region was revisited a month ago I found that the attack had been more serious this year, many young five-year old and older trees of the second growth having been killed. The area of infestation in Quebec appears to have spread also, and reports have been received from a number of owners of timber and pulp-wood limits as to the seriousness of the defoliation, which is very conspicuous from Mattawa across to the Saguenay River in Quebec. It has also been recorded from other districts in Quebec. What the results of this defoliation will be cannot be foretold. It is known that the insect was chiefly responsible for great destruction among the spruces in Maine some years ago. Now that it has spread over so wide a stretch of country nothing of a practicable nature can be done to control it. We are, therefore, studying the parasitic means of control, to which I hope to refer to-morrow, and we are also clearing up some obscure points in the life-history of the insect.

The White-marked Tussock Moth (*Hemerocampa leucostigma,* S. and A.) has been unusually abundant in the Maritime Provinces during the past year, especially in Nova Scotia. In Halifax and Charlottetown it has caused considerable alarm on account of its defoliation of the shade trees in those cities. The citizens appear to be fully alive to the danger of the repeated defoliation of their shade trees, and it is hoped that timely destruction of the egg masses in the winter and, if necessary, spraying in the summer will be resorted to.

Mr. Caesar has already referred to the occurrence of the Forest Tent Caterpillar. These insects occurred in very large numbers in New Brunswick, and also in British Columbia, where whole tracts of country were defoliated. We also received them from Edmonton, Alberta. The great abundance of the Fall Webworm, especially in some localities, was very noticeable during the past season.

Another caterpillar, of which I do not think we have yet heard the last, is the Green-striped Maple Worm (*Anisota rubicunda,* Fab.). This species was reported to the Division last year as defoliating the maples in a sugar bush, and this defoliation was stated to have caused a decrease in the amount of sap obtained from the trees. During the present year it was reported as defoliating maples in the Rideau Lakes, and along the northern shores of Georgian Bay the maples were stripped of their leaves.

Mr. Caesar: Have you seen much of the Thrips in Ontario?

Dr. Hewitt: I have not had any cases of the Thrips to which I refer reported as yet from Ontario.

Mr. Caesar: Does the whole of the wheat get that silvery appearance?

Dr. Hewitt: It is on oats that we have found it. The white and silvery appearance of the head and stem of wheat is usually due to the wheat-stem maggot.

Mr. Nash: Is the Rose Beetle generally reported?

Dr. Hewitt: I do not think that we have had many reports.

Mr. Caesar: It is fairly abundant round Clarkesville.

Mr. Swaine: I might mention, Dr. Hewitt, that I found the Spruce Budworm at Hudson, P.Q., this season. Have you had it reported as far south as that?

Dr. Hewitt: We have had it reported from a number of localities in Quebec, other than those which I have mentioned. I have found it within a few miles of the Vermont boundary.

NOTES ON THE SEASON OF 1910.

Rev. Thomas W. Fyles, D.C.L., Hull, Que.

The season of 1910 has been a very fine one, interrupted, however, with heavy thunderstorms. Some interesting species of insects have come under my notice in the course of the season.

Eucosma Scudderiana, Clemens The galls of *Eucosma scudderiana* have been very abundant. They begin to appear on the Golden Rod early in June. They are somewhat irregular in shape, and are covered with a rusty-looking scurf.

The larva is greenish-white. Its head is of a dark madder-brown; and the plate on the second segment is spotted with brown. On the body are numerous oval tubercles or plates. The spiracles are small and brown.

This species continues in the larval stage through the winter, and does not go into pupa till May. I have opened galls in March and April and found the larvæ active. They feed on the pith above and below their galls. The moths appear at the end of May.

Holland, in his beautiful and very useful work, "The Moth Book," telling of *Eucosma scudderiana,* says—

"The insect is not uncommon in western Pennsylvania, and is possibly an inquiline or intruder in the galls which are produced by another species, *Gnorimoschema gallæ-solidaginis,* Riley."—*The Moth Book,* p. 418.

The author is mistaken here. The galls of *G. gallæ-solidaginis* begin to appear at the same time as those of *scudderiana,* at a time when the moths of both species have passed away. It is not likely that a *scudderiana* larva would leave its own gall to go in search of one of the other kind.

The galls of *G. gallæ-solidaginis* may be readily known: they are of the shape of a half-grown turnip-radish; and they have not the rusty apearance of the Eucosma gall. *The moths from them appear in the month of August.*

Tetrastichus gelechiae, Ashmead. I have found two galls of *G. gallæ-solidaginis* this season—one at Abercorn in the eastern townships, and the other at Hull—in which the pupæ appeared abnormally large. By aid of the microscope I found that the enlargement was caused by the closely-packed chrysalids of a parasite *Tetrastichus gelechiæ.* The flies in due time appeared.

Camponotus pennsylvanicus, DeGeer. On June 14th—a very hot day—there was a remarkable flight of the large, black Carpenter Ants (*Camponotus pennsylvanicus*). The creatures were everywhere in the streets of Hull; but they were not abundant long, for the sparrows regarded a Black Ant as a *bonne bouche,* and banquetted upon the unexpected provision to their hearts' content. Useful sparrows! May the memory of Colonel Rhodes, who introduced them to Canada, be honoured!

A Strange Butterfly. On August 8th I captured a curious melanic form of *Argynnis myrina,* Cramer. Both the primaries and secondaries of this insect were suffused on the upper side with sooty black; but in the secondaries the inner margins, and a few spots in the centre of each, were of the normal color. On the under side the primaries were dusky brick red, with sooty black patches between the veins. The marginal silvery spots appeared. The secondaries on the under side were of a rich chocolate red. The black spot towards the base of each was enclosed by a narrow silvery ring. The spots were as usual. The body was black above and yellow beneath.

Mononychus vulpeculus, Fab. At Quyon, Province Quebec, on August 17th, I found that the seed-pods of the Blue Flag (*Iris versicolor*) were much infested

with a small beetle (*Mononychus vulpeculus*), in all its stages. The larvæ and pupæ were waxen in appearance. The beetle was a trim and handsome little insect. The following is a description of it:—Length, 5 millimetres; breadth, 3 millimetres. Color above, deep seal-brown. Elytra and thorax bordered with yellow. Thorax granulated. Elytra roughly striated. Eyes small and black, close to the proboscis .

Color beneath, that of burnt sienna on the sides, and grey under the abdomen and between the legs. Femora and tibiæ furry. Femur stout, somewhat flask-shaped. Tarsi ending with two pads or cushions, side by side, with a claw between them. Joints of tarsi very distinct.

Proboscis extending between the front pair of legs, as far as the middle pair; blunt, scaly—the upper part sienna-colored; the lower, dark grey.

I am indebted to the kindness of Dr. Howard and Prof. Schwarz, of the U. S. Bureau of Entomology, for the determination of the beetle.

I obtained from the affected Iris pods a considerable number of specimens of the parasite *Pimpla inquisitor,* Say.

Hemiptera on the Milk Vetch.

On September 1st, on a small patch of Milk Vetch (*Astragalus canadensis*), growing at Aylmer, Province Quebec, I found no less than six kinds of bugs. Amongst them were:—*Alydus conspersus,* Mont., and *Megalotomus quinquespinosus,* Say.

A. conspersus is black with an orange patch on the abdomen above. This can be seen only when the wings are spread.

M. quinquespinosus is a handsome insect, of a neat ochreous color. Its abdomen has black edges marked with pale yellow spots. It was named from the five spines on the femur of each of its hindmost legs.

For the identification of these two bugs I am indebted to Prof. Heidemann.

Basilona imperialis, Drury.

On October 2nd, Miss Effie Garrioch sent me, from Marshall's Bay, on the Ontario side of the Ottawa, three larvæ of *Basilona imperialis.* They were full fed, and went into the earth on the evening of their arrival. Two of them were of the deep green of the pine foliage; the other was of a rich rosy brown. They changed to pupæ on the 10th of the month. The following is a description of these remarkably handsome caterpillars:—Length, 3 inches; diameter, 5-6 inch. Head lobed, black, with clay-yellow upright markings in front, and paler yellow marks on the sides.

Forelegs, clay-yellow with black tips. Prop-legs, dark brown with a clay-yellow bar across them.

Body color a dark green—sometimes a rosy brown—with a purple dorsal-line, and a broad faintly purple band along each side.

The second segment has a black shield with four glossy warts on the front edge of it.

On the third, and again on the fourth, segment are two prominent warts, one on each side of the dorsal-line, pale yellow at the base and tip, and black, spotted with yellow, in the middle. In line with each of these pairs of warts, and on the seven next following segments, are creamy-white, pointed warts—one on either side of each of the segments. On the twelfth segment, at the top, is a glossy black,

prominent wart, tipped with yellow; and, a little behind it, are two small black warts. On the top of the thirteenth segment is a small black wart, faced with yellow. Along the purplish sideband, from segment three to segment twelve, there is a row of creamy-white, pointed, warts; and along the base, above the legs, from segment two to segment thirteen, on either side, is a row of similar, but smaller warts.

The spiracles are conspicuous, large, creamy-white, bordered with black.

The claspers are remarkably large. They are surmounted by a large triangular shield, edged on two sides with clay-yellow, and dotted with white. The claspers are bordered and dotted in the same way.

The creature is sparsely set, with light, brownish-yellow, bristles.

PELOPAEUS CEMENTARIUS, Drury. Adjoining the Matthews' Factory at Hull there is an electrical sub-station, belonging to the Hull Electric Company. In this station, three yards from a window, a telephone is affixed to a wall. One day, in August last, the man who occasionally visits this sub-station found that the telephone was out of order, and gave notice of this at the head office. The superintendent, Mr. Alfred Gale, went to see what was wrong, and, on opening the magneto-box, found a number of Mud-Wasps at work, piling up their cells upon the bar, which terminates on the outside of the box in the hook, or fork, in which the receiver is placed. Within the box, the spring, under the bar, was not strong enough to raise the additional burden; and consequently, no pressure was brought to bear upon the contact points, and the telephone failed to work.

The wasps found ingress to the magneto-box through the slot in which the bar plays.

REPORT OF THE COUNCIL.

The Council of the Entomological Society of Ontario begs to present its report for the year 1909-1910.

The forty-sixth annual meeting of the Society was held at the Ontario Agricultural College, Guelph, on Thursday and Friday, November 4th and 5th, 1909. There were a goodly number present from a distance as well as a large attendance of students and others connected with the College.

During the first afternoon the reports of the Directors on the insects of the year were read and discussed, papers were read by Mr. L. Caesar on "A few insects of the season"; by Mr. A. Gibson on "Nests of the Brown-tail Moth in importations of French nursery stock"; by Dr. C. Gordon Hewitt on "The large Larch Sawfly"; by Mr. R. C. Treherne on "Nursery work in Ontario," and by Mr. F. J. A. Morris on "Some Guests at the Banquet of Flowers." In the evening a public meeting was held in Massey Hall, which was well filled with members and students from both the Agricultural College and the Macdonald Institute. A very interesting lecture on "House Flies and their Allies," illustrated with excellent lantern pictures, was delivered by Dr. C. Gordon Hewitt, the newly appointed Dominion Entomologist.

The morning and afternoon of the second day were occupied with the reading of the reports of the various branches and officers of the Society, and a number of papers on a variety of subjects, which have all been published in the Annual Report for 1909. This volume, the fortieth of the series, was issued in May last and contained 144 pages, illustrated with 6 full-page plates, 39 figures in the text and a portrait of the late Dr. William Brodie. In addition to the papers already men-

tioned, the volume contained the following articles: "The origin and diffusion of Entomological Errors," by Mr. H. H. Lyman; "Conflicts between Ants," by Mr. G. E. Sanders; "The Snow-white Linden Moth," by Mr. A. F. Winn; "Notes on Fruit-tree Scolytids," by Mr. J. M. Swaine; "Observations on Ontario insects in 1909," by Dr. Bethune; "Injurious Insects of Quebec in 1909," by Prof. Lochhead; "Adaptations in the structure of insects" and "Anisota virginiensis," by Dr. Fyles; "The Acarina, with a Host Index to the species found in Ontario," by Prof. T. D. Jarvis; "The Spruce Bud-worm" and "The Entomological Record for 1909," by Mr. Arthur Gibson; concluding with a sympathetic obituary notice of the late Dr. Brodie, by Mr. Frank Morris.

The *Canadian Entomologist*, the monthly magazine of the Society, has been regularly issued at the beginning of each month. The forty-first volume was completed in December last; it consisted of 440 pages, and was illustrated with 11 full-page plates and 13 figures from original drawings. The contributors numbered 73, and included writers in Ontario, Quebec, British Columbia, England, sixteen of the United States, the Hawaiian Islands, Panama Canal Zone; Calcutta, India; and Russia. During the year seven new genera were described and 239 new species, sub-species and varieties.

At the close of the volume, Dr. Bethune resigned the position of editor, which he had held since October, 1886, owing to the disability caused by impaired eyesight in addition to the weight of advancing years. His place has been ably filled by Dr. E. M. Walker, Lecturer in Zoology at the University of Toronto, and the magazine has continued to be issued with unimpaired excellence.

Meetings of the Society were held during the winter months at the Ontario Agricultural College on alternate Wednesday afternoons. The attendance included several of the more advanced students and much interest was taken in the papers and discussions. The following subjects were taken up during the course of the meetings: "Achievements in Economic Entomology," illustrated with lantern pictures, by Prof. Bethune; "Insects as causes of disease, with special reference to the Protozoa," by Prof. Jarvis; "The Insects of Saskatchewan," by Mr. S. J. Neville: "Aphids," by Mr. A. C. Baker; "An account of the Meeting at Boston of the American Association for the Advancement of Science," by Mr. L. Cæsar; "Notes on the Calliphorinean Genus Lucilia," by Mr. J. D. Tothill.

The unveiling of the drinking fountain erected in the grounds of the Central Experimental Farm at Ottawa in memory of our late President, Dr. James Fletcher, took place on Tuesday afternoon, July 19th, and was largely attended. Our Society was represented on the occasion by two former Presidents, Dr. William Saunders, Director of the Dominion Experimental Farms, and Dr. Bethune, of the Ontario Agricultural College, who both took part in the proceedings by giving short addresses. There were also present a number of our members resident in Ottawa and the neighborhood.

The first International Congress of Entomology was held during the month of August last at Brussels and was in every respect a complete success. Our Society was represented by our former President, Mr. Henry H. Lyman, of Montreal, who read a paper on Nomenclature. He has furnished us with an interesting report of the proceedings.

It is with much regret that the Council has learned that the members in Quebec have been unable to maintain the branch of the Society which for many years was in successful operation there. The removal of the Rev. Dr. Fyles has taken away the most active member whose enthusiasm inspired the rest of the members and kept

up the meetings with great interest. No one has so far been found to take his place, and accordingly the operations of the branch have been suspended.

A similar fate, we regret to say, has befallen the branch of the Society in British Columbia. Mr. R. V. Harvey, Headmaster of the University School at Victoria, has found his time so much occupied that he has been unable to give any attention to the work of the branch. Its operations have on this account been suspended for the time being, but it is hoped and expected that before very long its operations will be resumed. The great difficulty consists in the geographical distribution of the members, who are very widely separated from one another and consequently are unable to hold meetings.

The Council has to deplore the loss of Mr. G. W. Kirkaldy, of Honolulu, who died in San Francisco on the 2nd of February last. He was a very able and energetic entomologist and contributed frequently to the pages of our magazine. He especially devoted himself to the Hemiptera, and had begun a catalogue of the species throughout the world, the first volume of which has just been issued.

Respectfully submitted,

TENNYSON D. JARVIS, *President.*

FIRST INTERNATIONAL CONGRESS OF ENTOMOLOGY.

HENRY H. LYMAN, MONTREAL, QUEBEC.

If anyone entertained any doubts of the possibility of making a Congress devoted exclusively to Entomology a success, such doubts must have been dispelled by the results of the First International Congress of Entomology held at Brussels from August 1st to 6th, 1910.

A correspondent of the London *Times* writing of the Congress said: "Entomology is at last recognized officially as an important science. The study of insects, so long looked upon with disdain as a pastime for children and old men, has at last vindicated its claim as a valuable branch of human mental activity. That is to say, from being a purely intellectual exercise, entomology has developed a most important practical aspect that will, in the near future, have a profound and far reaching effect upon the lives and fortunes of millions. The discovery of the astonishing phenomenon that one species of mosquito, and one only, is the vehicle for the transmission of yellow fever, another of malaria, while a single kind of biting fly communicates sleeping sickness to the teeming millions of the African continent, has a direct and vital influence upon tropical medicine; and the Americans have long since realized that an accurate knowledge of the habits of one kind of beetle may save agriculturists from damage that may result in the loss of hundreds of thousands of pounds. Thus entomology has won the serious attention of practical men who, acting together with the purely academical devotees of the pure science, have demonstrated their attachment to and appreciation of their study by organizing an International Congress that has received the hearty support of institutes, departments and governments."

The following important bodies were represented at the Congress: the British Colonial Office, the Tropical African Entomological Research Committee, Cambridge University, Oxford University, the Board of Agriculture,

the Royal Colonial Institute, the Imperial Department of Agriculture in the West Indies, the British (Natural History) Museum, the Royal Society, the Linnean Society, the Zoological Society, the Entomological Society of London, the University of London, the Commonwealth of Australia, the Commonwealth of South Africa; the Royal British Arboricultural Society, the University of Edinburgh, the East of Scotland College of Agriculture, the Royal College of Science of Dublin, the Agricultural Research Institute of Pusa, Bengal; the Carnegie Institute of Pittsburg, the Entomological Society of America, the Academy of Natural Sciences of Philadelphia, the Entomological Society of Ontario, etc., etc.

Besides entomologists residing in Brussels, delegates were also present from other parts of Belgium and from Madrid, Zaragoza, Barcelona, The Hague, Leyden, Amsterdam, Berlin, Zürich, Königsberg, Vienna, Bologna, Genoa, Milan, Luxemburg, Paris, St. Petersburg, Moscow, Budapest, Pittsburg, Philadelphia, Columbus, Montreal, Tokio, Buenos Ayres, etc.

On the evening of Sunday, July 31st, a reception was held by the Entomological Society of Belgium for those attending the Congress and accompanying ladies at the Maison des Medicins, while the first meeting of the Congress was opened the following morning at the Salle des Fêtes of the Exhibition by the President of the Congress, Prof. Auguste Lameere, Rector of the Free University of Brussels, the Secretary being Mr. G. Severin.

The meetings were divided into general sessions and sectional meetings, ten sections being arranged for as follows:—

1. Systematics.
2. Nomenclature and Bibliography.
3. Museology and History of Entomology.
4. Zoogeography.
5. Bionomy, Œcology, Cecidiology and Mimicry.
6. Physiology and Psychology.
7. Economic Entomology .
8. Medical Entomology.
9. Anatomy and Ontogeny.
10. Phylogeny, Palæontology and Evolution.

Members were given a very handsome silvered bronze badge of Gothic design, having on the obverse an illustration of the Hotel de Ville and "Bruxelles," "1910," and on the reverse "1r Congrès International d'Entomologie," and, by the courtesy of the Exhibition Committee, passes to the Exhibition for the term of the Congress.

The more serious work of the Congress was varied by visits to the Exhibition, museums, excursions and receptions. At the Royal Museum of Natural History an excellent portrait group was taken.

Among the most important papers read may be mentioned a lecture by Dr. R. Blanchard, of Paris, on Medical Entomology, dealing with the transmission of malaria, yellow fever and sleeping sickness, and it may be mentioned that there was a most interesting exhibit in connection with these subjects in the Exhibition. Mr. Theobold, of Wye College, gave a lecture on the distribution of *Stegomyia fasciata*, the conveyer of yellow fever. Sir Daniel Morris described the methods employed by the Imperial Department of Agriculture in the West Indies to prevent the introduction of insect pests by fumigation and quarantine. Dr. G. H. Carpenter, of the Royal College of Science, Dublin, gave an instructive account of the warble fly, *Hypoderma bovis*. He declared the so-called preventive washes quite useless, but had not concluded his investigations.

Dr. R. Stewart MacDougall, of Edinburgh University, described the ravages of a small beetle, *Galerucella lineola,* that has done an immense amount of damage to the osier beds in the Midland and Eastern counties of England, and recommended arsenical sprays for its control.

Good lectures on Ants and their guests and enemies were delivered by Father Wasman, S.J., of Luxemburg, and Mr. H. S. K. Donisthorpe, of London, with lantern slides, showing the various domestic animals kept and used by the ants.

The highly interesting study of mimicry was dealt with by Prof. E. B. Poulton, of Oxford, who exhibited a large number of boxes of butterflies, all caught in one small patch of forest in Uganda, showing the common species which are distasteful to birds and other enemies, and the rarer species which, though belonging to a totally different group, and in no way related structurally, enjoy a relative immunity from attack by a very close resemblance to the distasteful forms. Dr. F. A. Dixey, Mr. Frederick Merrifield, and Dr. K. Jordan also spoke on the same subject.

Prof. Y. Sjostedt, of the Natural History Museum, of Stockholm, gave an account of the Swedish expedition of twelve months to Kilimandjaro and its prolific results.

Mr. J. N. Howlett, of Pusa, Bengal, described the difficulties of preserving collections of insects in the climate of India. Dr. Holland spoke on the preservation of type specimens, and Dr. Henry Skinner read a paper on One Hundred Years of Entomology in the United States, but ignoring the influence exerted upon it by the *Canadian Entomologist.* He referred to the steady and great growth of Economic Entomology during recent years and the very large sums appropriated by the Federal and State Governments for the control of injurious insects.

On the last afternoon a brief paper was read by Mr. Lyman, urging the importance of an authoritative pronouncement upon the correct use of such terms as type, co-type, etc., and of universal adhesion to such use and protesting against changes by some authors in the spelling of scientific names.

The number of adherents reported was 270, but the list of those reported as attending the Congress gave 141 names of gentlemen, many being eminent in the science, and 32 ladies accompanying delegates. And of all countries represented the British Empire had the largest number of delegates.

The representatives of the United States were Dr. Holland, Dr. Skinner and Mr. Osborn, while Mr. Lyman was the only representative from Canada.

At the last General Session on the morning of Friday, August 5th, the election of a Permanent Committee took place, and it was decided to hold the next Congress in the summer of 1912, and on the invitation of the gentlemen from Oxford that ancient seat of learning was selected as the next place of meeting, and Prof. Poulton was chosen President.

The Permanent Committee for the United States consists of P. P. Calvert, T. D. A. Cockerell, J. H. Comstock, H. C. Fall, C. P. Gillette, W. J. Holland, A. D. Hopkins, L. O. Howard, C. W. Johnson, V. L. Kellogg, H. Osborn, J. B. Smith, C. W. Stiles, C. Wellman, W. M. Wheeler, and for Canada C. J. S. Bethune, C. G. Hewitt, H. H. Lyman; while the Permanent Executive Committee consists of M. Burr, K. Jordan, W. Horn, P. Lesne, G. Severin and H. Skinner.

The conclusion of the Congress was celebrated by a grand banquet on Friday evening at the Taverne Royale, participated in by the ladies accompanying some of the delegates, when after the inner man (and woman) had been satisfied with the excellent repast served in the best style, many speeches were made and good fellowship prevailed. The gathering broke up before midnight, as all-day excur-

sions had been arranged for the next day, the majority going to Bruges and Ostend.

The concluding reception was the grand one given at the old and wonderful Hotel de Ville by the Burgomaster, Mons. Max, on Sunday evening, August 7th, when that magnificent building, so rich in beautiful architecture, tapestries, pictures, frescoes and bric-a-brac, was thrown open to the guests of the city. Thus, amid scenes of brilliance and splendour in this stately mediæval building, came to an end this First International Congress of Entomology, all looking forward with pleasure to the next meeting at Oxford in 1912.

ANNUAL REPORT OF THE MONTREAL BRANCH.

The thirty-seventh annual meeting of the Montreal Branch was held at 74 McTavish Street, on Saturday evening, May 14th.

Members present: Messrs. H. H. Lyman, in the chair; G. A. Southee, G. Chagnor, E. C. Barwick, Geo. A. Moore, A. E. Norris, W. G. Gerth, and A. F. Winn.

The minutes of the April meeting, and of the last annual meeting, were read and confirmed.

Mr. H. Earby was elected a member of the Branch.

The Secretary read the following

Report of the Council.

Nine meetings have been held during the season 1909-'10, the average attendance being a fraction over 9, which is an improvement on the previous year; but, considering that the population of Montreal is over 600,000, there should be more than a score of persons interested in Entomology. Three new names have been added to our roll, but three others have resigned.

Below is a list of the papers read (most of which were illustrated by specimens), and the discussions following them were of interest.

Annual Address of the President, Geo. A. Moore.
A Spring Outing, H. H. Lyman.
Lepidoptera taken at St. Hilaire, May 24th, 1909. A. F. Winn.
Notes on Coleoptera taken at St. Hilaire, May 24th, 1909, G. Chagnon.
Life History of Philometra metonalis, H. H. Lyman.
How can we increase the interest in our meetings? H. H. Lyman.
My Best Captures in 1909, G. Chagnon.
Occurrence of Ennomos subsignarius at Montreal, A. F. Winn.
Hemiptera taken at St. Hilaire, G. A. Moore.
Proposed List of Insects of the Province of Quebec. A. F. Winn.
Account of Annual Meeting and a Visit to Trenton, A. F. Winn.
On Panthea and Demas, H. H. Lyman.
A New Scolytid Enemy of White Spruce, J. M. Swaine.
The Winter Quarters of Doryphora clivicollis, A. F. Winn.
Our White Butterflies, A. F. Winn.
Calligrapha rowena, G. Chagnon.
Paonias astylus at Biddeford, Me., A. F. Winn.
The Berytidæ, or Stilt-bugs, G. A. Moore.
Random Notes on Lepidoptera, A. F. Winn.
An Hour at Montmorency, H. H. Lyman.
The Noctuidæ and how to Collect Them, I., A. F. Winn.
Butterfly Collecting in British Columbia (by John Russell, Hope, B.C.), read by A. F. Winn.
The Cydnidæ or Burrowing Bugs, G. A. Moore.
The North American Copper Butterflies, H. H. Lyman.

The annual outing at St. Hilaire, on Victoria Day, was well attended, but the backward season made the captures of insects much smaller than usual, but among the Coleoptera several good catches were made and the Lepidopterists had the pleasure of finding two specimens of a little Heliothid moth, probably undescribed, closely resembling *Heliaca nexilis* of the Rocky Mountains. No species of the genus have hitherto been recorded from the East.

At the January meeting we had the pleasure of a visit from Mr. F. H. Wolley Dod, of Millarville, Alberta, who gave an account of his visits to collectors of Noctuidæ throughout Canada. It was hoped that the Rev. Dr. Fyles would be able to attend our meeting this evening, but it could not be arranged.

The annual meeting of the parent Society at Guelph was attended by the President and the Secretary.

The report of the Treasurer shows a balance on hand of $76.79.

The Curator reports that the specimens in his charge are in good condition but that no additions have been made to the collection and that the members have made little use of either the specimens or the books. It is probable in connection with the preparation of the List of Insects of the Province of Quebec that a considerable number of specimens of the more neglected orders will be collected, determined and eventually find their way into our collection. The books added to the library consist of a copy of Pierce's "Genitalia of British Noctuidæ," the current volume of the *Canadian Entomologist,* and the entomological publications of N.Y. State.

Respectfully submitted on behalf of the Council.

(Signed) Albert F. Winn, *Sec.-Treas.*

Mr. Lyman then read his annual address, after which the election of officers for the ensuing year was proceeded with, and last year's officers were all re-elected, namely: Henry H. Lyman, President; G. A. Southee, Vice-President; A. F. Winn, Secretary-Treasurer; L. Gibb, Curator and Librarian; Members of Council—G. Chagnon, G. A. Moore, E. C. Barwick, F. Parkins, jr.

ANNUAL REPORT OF THE TORONTO BRANCH.

The 51st regular and 14th annual meeting of the Toronto Branch was held in the Biological Department of the University of Toronto, on June 9, 1910.

During the year eight meetings have been held with an average attendance of seven members. The place of meeting has been changed from the Normal School to the Biological Building, and library and collections have been moved.

The following papers were read:—

White Pine Weevil, Dr. E. M. Walker.
Structural Peculiarities of Galls, A. Cosens.
A Month at the Biological Station at Go Home Bay, J. B. Williams.
The Relation between Parasitism and Structure in Insects, Dr. Walker.
Wing Venation, Arthur Smith.
The Work of Scolytid Beetles in Queen's Park, Toronto, Dr. Walker.
The Oriental Moth, H. H. Lyman, of Montreal Branch.
A Hunt and What Came of It: Discovery of *Copidosoma Lymani*, H. H. Lyman, of Montreal Branch.
Some Types of Saw-flies, A. Cosens.
The Larch Saw-fly, Dr. Walker.

The following officers were elected for the next year:—

President—Dr. E. M. Walker; Vice-President, A. Cosens; Secretary-Treasurer, Arthur Smith; Librarian-Curator, J. B. Williams; Council—Messrs. Wood, Laing, Ivey, and Dr. Abbott.

The Treasurer's report shows a balance on hand of $0.20.

ARTHUR SMITH, *Secretary-Treasurer.*

REPORT OF THE LIBRARIAN.

During the year ending September 30th, 1910, eighteen bound volumes have been added to the Library, making the total number on the register 2,018; there are besides a number of volumes of periodicals in the hands of the bookbinder, which should have been ready for inclusion in this report. The Library continues to receive by exchange a large number of serial publications, bulletins, and pamphlets from many different countries and in a variety of languages, many being of great scientific value. A card catalogue of the bound volumes was made during the winter, but has not yet been finally completed for reference; to make it entirely useful it will be necessary to rearrange all the books in the Library on a definite system; it is hoped that this may be accomplished before very long.

Among recent additions may be mentioned the following works: Sir George Hampson's Catalogue of the Lepidoptera Phalænæ in the British Museum, volume viii.; Rothschild and Jordan's Revision of American Papilios; Needham's General Biology and Lefroy's Indian Insect Life.

The Library is constantly made use of by the senior students and members of the staff during the College year and is highly appreciated by them.

Respectfully submitted,

CHARLES J. S. BETHUNE, *Librarian.*

THE CURATOR'S REPORT.

The Society's collections have been carefully examined from time to time throughout the year and the necessary precautions taken against injury from museum pests or from other causes. Since the last annual meeting, 268 new specimens have been added. Of these 262 were contributed by Mr. John D. Evans, of Trenton, 134 belonging to the order Hymenoptera, and the remainder to the Hemiptera. As these orders are not at all fully represented in the Society's collections, Mr. Evans' gift is very valuable and will be much appreciated by the members. The remaining 6 specimens were contributed by the curator from insects of some economic importance not found in the collections.

Respectfully submitted,

L. CAESAR, *Curator.*

REPORT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO TO THE ROYAL SOCIETY OF CANADA.

Rev. Thomas W. Fyles, D.C.L., Hull, Que.

I have the honour to present the following report from the Entomological Society of Ontario:—

This Society held its forty-sixth annual meeting in the Ontario Agricultural College, Guelph, on the 4th and 5th days of November last. There was a large attendance—members from Ottawa, Toronto, Montreal, Port Hope, Trenton, Grimsby and Guelph being present. Important subjects were brought before the meeting by the district directors and discussed: The destruction of cut-leaf birch trees by the Red-necked Borer; attempts to control the Tussock Moth; the extension of the San José Scale to Prince Edward County; the work of the Blackberry Saw-fly; that of the Spruce Gall-louse; the importation of Brown-tail Moth larvæ on French nursery stock; and other matters of interest to fruit-growers and foresters.

In the evening a public meeting was held in the Massey Hall auditorium, which was well filled with students of the College, both male and female, and a number of visitors from the town, together with members of the Society gathered in session. "Dr. C. Gordon Hewett, the newly-appointed Entomologist at the Experimental Farms of the Dominion, gave a highly interesting and instructive address, illustrated by a series of admirable lantern pictures, on 'House Flies and Their Allies.' The College orchestra added much to the enjoyment of the evening by the musical selections they rendered." (*Can. Ent.*, vol. xli., p. 429.)

In the forthcoming Annual Report of the Society, the papers read before the meeting will be found in full. The titles of them denote their interest to naturalists and to the agricultural community. They are:—

Observations on Insects of the Season, L. Caesar.
Injurious Insects of Ontario, C. J. S. Bethune.
Injurious Insects of Ottawa, A. Gibson.
Injurious Insects of Quebec, W. Lochhead.
The Origin and Diffusion of Entomological Errors, H. H. Lyman.
Some Guests at the Banquet of Blossoms, F. J. A. Morris.
Nests of the Brown-tail Moth, A. Gibson.
Nursery Inspection Work in Ontario, R. C. Treherne.
House-flies and their Allies, C. G. Hewitt.
The Larch Saw-fly, C. G. Hewitt.
Conflicts between Two Species of Ants, G. E. Sanders.
Snowy White Linden Moth, A. F. Winn.
Adaptations of Insect Structure, T. W. Fyles.
The Life-history of Anisota virginiensis, T. W. Fyles.
The Acarina found in Ontario, T. D. Jarvis.
Notes on Fruit-tree Scolytids, J. M. Swaine.
Entomological Record for 1909, A. Gibson.
The Spruce Bud-Worm Tortrix, A. Gibson.
Memoir of Dr. Brodie, F. J. A. Morris.

The Report is illustrated with a portrait of the late Dr. Brodie and with five half-tone plates. There are also thirty-nine illustrations in the text.

The *Canadian Entomologist*, the monthly organ of the Society, maintains its well-earned reputation. From its mail list for last month it appears that the magazine is not only circulated in Canada, but is taken in the United States, in fourteen countries of Europe, in India, Japan, the Philippine Islands, Egypt, Cape Colony, Natal, Portuguese E. Africa, Australia, New Zealand, Tasmania, Brazil, the Argentine Republic, Uruguay, Hawaii, and in five of the West Indian Islands.

The volume for 1909, the forty-first volume, contains articles from seventy-three contributors. Amongst these are correspondents in Calcutta, Honolulu, Panama, and St. Petersburg. These facts show how widely the influence of the Society extends. In this volume no less than two hundred and twenty-eight newly discovered species of insects are brought into notice and named, together with fourteen sub-species and eight varieties. The following are the titles of some of the more important of the articles that appear in the volume:—

Preparation of Beetles for the Microscope, H. F. Wickham, Iowa City.
Lepidopterous Galls collected in the Vicinity of Toronto, Dr. Wm. Brodie.
Notes on Tenthredinoidea, with Description of New Species, S. A. Rohwer, Boulder, Colo.
New Histories and Species in Papaipema (Hydrœcia), Henry Bird, Rye, N.Y.
The Fruit-infesting Forms of the Dipterous Genus Rhagoletis, with One New Species, J. M. Aldrich, Moscow, Idaho.
Some North American Jassidæ, E. D. Ball, Logan, Utah.
On the Orthoptera of Northern Ontario, E. M. Walker, Toronto.
New Coleoptera from the South-West, H. C. Fall, Pasadena, Calif.
Some New Bees, and Other Notes, T. D. A. Cockerell, Boulder, Colo.
Some Curious Californian Leaf-hoppers, E. D. Ball, Logan, Utah.
The Hepialidæ, or Ghost-moths, Albert F. Winn, Westmount, Que.
Some New Species of N. A. Geometridæ, John A. Grossbeck, New Brunswick, N.J.
List of Siphonaptera of California, M. B. Mitzmain, San Francisco, Calif.
A Summer with Chrysophanus Dorcus, William W. Newcomb, M.D., Detroit, Mich.
New Geometrids of the Genus Hydriomena, L. W. Swett, Boston, Mass.
Notes on Pachybrachys, and Descriptions of New Species, Fred. C. Bowditch, Brookline, Mass.
Studies in the Caraboidea and Lamellicornia, Thomas L. Casey, Washington, D.C.
Some Recent Contributions to Hemipterology, J. R. De la Torre Bueno, White Plains, N.Y.
Coccidæ from the Society Islands. R. W. Doane and Evelyn Hadden, Stanford University, Calif.
New Pseudoscorpionida, Nathan Banks, East Falls, Church, Va.
Notes on the Larva and Pupa of Sthenopis thule, J. M. Swaine, Macdonald College, P.Q.
A New Genus and Some New Species of Tenthredinidæ, Alex. D. Macgillivray, Ithaca, N.Y.
Notes on the Preparatory Stages of Philometra metonalis, Henry H. Lyman, Montreal.
Synonymical and Descriptive Notes on North American Heteroptera, Edward P. Van Duzee, Buffalo, N.Y.
Notes on Lachnus caryæ, H. F. Wilson, U. S. Dept. Agr., Bureau of Entomology.
Hemiptera, Old and New, G. W. Kirkaldy, Honolulu, Hawaiian Islands.
Some Guests at the Banquet of Blossoms, F. J. A. Morris, Trinity College School, Port Hope, Ont.
Phylogeny of the Lithocolletid Group, Annette F. Braun, Univ. of Cincinnati, Ohio.
The Eupitheciæ of Eastern North America, George W. Taylor, Nanaimo, B.C.

The volume also contains obituary notices of Mr. G. W. Peck and Professor M. V. Slingerland, and a memoir of William Henry Edwards—all well-known entomologists.

Eleven plates and thirteen other illustrations add interest to the volume.

At the close of last year the Rev. C. J. S. Bethune, who had conducted the *Canadian Entomologist* for many years with great care and ability, found it necessary to retire from active editorial work, much to the concern of the members of the Society, who have highly appreciated his services. However, a worthy successor in the editorship of the magazine has been found in Dr. E. M. Walker, of the Biological Department of Toronto University.

Dr. Bethune has been appointed *editor emeritus* by the executive of the Society.

In the Society's library at Guelph there are more than two thousand bound volumes and a very large number of unbound publications, bulletins, proceedings of societies, etc.

The Society's cabinets contain a very complete collection of the Lepidoptera and Coleoptera of the Provinces of Ontario and Quebec and a good number of representatives of the other orders. In addition there are many very beautiful specimens of exotic Lepidoptera.

The Branch Associations connected with the Society are doing excellent work. They spread the knowledge of economic entomology to the great benefit of the farmers, horticulturists, and fruit-growers, in their several localities.

EVENING SESSION—THURSDAY, NOVEMBER 3RD, 1910.

A public meeting was held at 8 o'clock p.m. in the Massey Hall Auditorium, at which there was a good attendance of students and representatives of the College staff, as well as of members of the Society. The chair was taken by Mr. C. C. James, Deputy Minister of the Ontario Department of Agriculture. The proceedings were enlivened by some musical selections given by members of the College Philharmonic Society. After a few remarks by the Chairman congratulating the Society on reaching its forty-seventh annual meeting, and referring to the amount of good work that it has accomplished, he introduced the speaker of the evening, Professor James G. Needham, of Cornell University, Ithaca, N.Y., who occupies the chair of Limnology in the Department of Entomology. His subject was "The Role of Insects in Water-life," illustrated with many beautiful lantern pictures. The following is an abstract of his remarks:—

THE ROLE OF INSECTS IN WATER-LIFE.

PROF. JAMES G. NEEDHAM (*Abstract*).

Aquatic insects are not found in all the waters of the earth, but are mainly restricted to shoal parts of fresh water and to the shelter of rocks and vegetation. There are but few found inhabiting even the bottoms of our deeper lakes and streams, a few blood worms, caddis-worms and the burrowing nymphs of May-flies, and there is but one, *Corethra,* that is strictly free-swimming in habits and a constant denizen of the open water. Moreover, it is mainly the larval stages of insects that are aquatic; only these breathe by gills, and the larvæ are tied by parentage to the shores.

Alongshore, however, insects constitute a very important part of the submerged population, being present often in inconceivably vast numbers. Sometimes a species, like the great May-fly, *Hexagenia,* that is synchronous in its habits of transformation, comes forth in swarms that darken the air on a midsummer evening, but the vast majority of aquatic insects are not thus concerted in habits and give us no visible demonstration of their abundance. Yet they abound in all aquatic situations in shoal water. Some groups, like the stone-flies, are fitted for life in rapid waters only, but most of the larger groups, like the flies and the beetles and the dragon-flies, contain representatives expressly adapted to situations of the utmost diversity. The rapid-water forms are usually flattened and depressed in body for attachment to the surface of stones where the water glides over them. And, on the other hand, those in stagnant waters usually possess devices for protecting their delicate gills from the accumulation of sediment.

The collector who knows something about the habits of the insects he gathers alongshore is usually struck with the apparent preponderance of carnivorous forms. All of the dragon-flies and bugs, nearly all of the beetles and the larvæ of many flies, are of strictly carnivorous habits and are very much more in evidence than the herbivorous May-flies or midge larvæ or those algæ-feeding beetle larvæ of the family Haliplidæ that has recently been demonstrated to be herbivorous.

The lecturer then showed many lantern slides illustrating species of May-flies, beetle larvæ and caddis-worms that are being studied especially at the Biological Field Station of Cornell University. He discussed the varying reproductive capacity, length of life, food and shelter requirements of these species, and showed in conclusion the possibilities of artificial increase by rearing in pure cultures and the possibilities of conservation of the natural supply of these excellent items of fish food by providing proper shelter and by protecting the foraging grounds.

The Chairman, Mr. C. C. James, expressed the pleasure that all present had derived from the address and the surprise that all shared in at the importance of aquatic insects as regards the provision of food for fishes. A vote of thanks to Prof. Needham was moved by President Creelman, seconded by Dr. C. Gordon Hewitt, and heartily adopted by the meeting.

SECOND DAY'S SESSION—FRIDAY, NOVEMBER 4TH, 1910.

The first portion of the morning was spent in the Society's part of the College Museum, and was devoted to an inspection of the extensive collections of Lepidoptera and Coleoptera and the specimens brought by the members. Among the various interesting examples presented may be mentioned a large collection of beetles captured upon foliage in illustration of Mr. F. J. A. Morris's paper; these specimens were beautifully mounted and carefully labelled. Prof. J. M. Swaine exhibited a series of specimens of Scolytid beetles and their work as wood-engravers and timber destroyers.

Dr. Hewitt exhibited a case containing the partial life-history of the Spruce Budworm (*Tortrix fumiferana*). This contained moths, larvæ, chrysalids, and several species of parasites, as well as drawings of the mature larva and end of twig showing the winter shelters of the young larvæ. In a separate case was exhibited the characteristic work of the caterpillars. Dr. Hewitt also placed on view a case containing the work of six different species of *Chermes* which had been donated to the Division of Entomology by Miss Edith M. Patch, of Orono, Maine, and specimens of the parasite, *Tropidopria conica,* reared from *Eristalis.*

Mr. Gibson exhibited a case containing rare Noctuids and Arctians. Among these were *Stretchia plusiiformis* and *Apantesis michabo* from Hymers, Ont.; *Momophara comstocki,* from McNab's Island, N.S.; *Sphinx perelegans,* from Wellington, B.C.; and a series of moths of the genus *Xylina* from the Ottawa district. An inflate of the mature larva of *Estigmene prima* was also shown, which had been reared from eggs obtained at Shawville, Que., by Mr. A. F. Winn.

The following were noted among the specimens exhibited by Mr. Lyman:—

Grapta gracilis, from the White Mountains.

Argynnis montinus, Chinobas semidea, Colias interior, Parchnobia wockei? and *Anarta schoenherri* from Mt. Washington.

Hepialus gracilis from the White Mountains.

Also the following from Hymers, Ont., received from Mr. Horace Dawson:—

A beautifully suffused specimen of *Argynnis atlantis.*

A curious completely suffused specimen of *Argynnis bellona.*

Phragmatobia assimilans, var. *franconia* Sloss.

Hyphoraia parthenos, the outer brown band on secondaries reduced to dots.

Graptolitha hemina. (This specimen was compared with Grote's type in the British Museum by Mr. Lyman and positively identified.)

Leucobrephos brephoides.

Cossus centerensis.

Cossus undosus?

Sthenopis argenteomaculatus.

Hepialus hyperboreus.

Dr. Walker exhibited a case containing the nymphs or larvæ of the following species of Canadian Aeshninae (a group of large dragon-flies): *Boyeria vinosa, B. grafiana, Basiaeschna janata, Nasiaeschna pentacantha, Anax junius, Aeshna juncea, eremita, interrupta (?), clepsydra, canadensis, palmata, umbrosa, constricta, californica and multicolor.* This includes all the known nymphs of North American species of Aeshna. He also showed an aberrant specimen of the butterfly *Charidryas nycteis* and the galls of three species of *Chermes* from black and white spruce in Ontario.

At eleven o'clock the election of officers for the year 1910-1911 was proceeded with and Dr. E. M. Walker was unanimously elected President and Dr. C. Gordon Hewitt Vice-President. The complete list is given on page 9.

The following resolution, moved by Mr. Henry H. Lyman and seconded by Mr. Arthur Gibson, was adopted:—

"That Past Presidents of the Society be invited to present to the Society framed photographs of themselves taken on a plate 10 by 8 inches with mat or border not over 3 inches wide, and that in the case of deceased Presidents the Council endeavour to have similar portraits prepared where photographs can be obtained for enlargement."

Professor J. M. Swaine, of Macdonald College, St. Anne de Belleville, P.Q., addressed the Society as follows:—

Mr. Chairman and gentlemen,—I have the honour this afternoon to represent officially the Quebec Society for the Protection of Plants. Two years ago, at a meeting at Macdonald College, we formed a society which we called The Quebec Society for the Protection of Plants from Insect Pests and Fungus Diseases. The name is rather long but it expresses very well our purpose. The Society receives financial assistance from the Quebec Government, and is thereby enabled to publish an annual report. Prof. Lochhead has been our President since the organization of the Society. We hold two meetings annually—a winter meeting, so far held at Macdonald College, at which papers are read, and business is transacted; and a summer meeting at La Trappe. This summer meeting lasts for two days and is devoted chiefly to collecting and discussions. La Trappe is an excellent collecting ground, and we have always a delightful outing among the beautiful orchards and vineyards and fine farms of those most hospitable gentlemen, the Trappist Fathers and Brothers.

Our members are few as yet, but we are ambitious, and hope to do something in the way of investigation and distribution among the Quebec farmers of a knowledge of the methods of controlling injurious fungi and insects which will justify our existence as a society.

I have then, sir, the privilege this afternoon of presenting to you and your Society the greetings and the good wishes of the Quebec Society for the Protection of Plants.

BEETLES FOUND ABOUT FOLIAGE.

F. J. A. Morris, Trinity College School, Port Hope.

During my five years or more of collecting, I have captured, on and about foliage, species belonging to eight or ten of the great families of beetles. Some of these have been merely incidental and I know of nothing in their habits to connect them with the tree or herbaceous plant on which I found them. For instance, there is a species of Lagriid, a family closely related to the Tenebrionidæ or Darkling Beetles, which I have often taken on foliage—*Arthromacra ænea*: usually the beetle is found feeding in blossoms of the dogwood, occasionally on the foliage of that shrub, but quite often I have seen it on the leaves of the May-apple (*Podophyllum peltatum*), the New Jersey Tea (*Ceanothus americanus*), and the Sweet Fern (*Comptonia asplenifolia*); it appears to have a special fondness for this last shrub and on bright, hot days of July is often abundant in patches of Sweet Fern.

So far as I know it does not eat the leaves, but contrary to the general habit of the Tenebrionids it certainly courts bright sunshine. There is an allied genus in Great Britain (*Lagria hirta*) said to be found on blossoms and in hedges, which even in the larval stage is remarkable for its habit of wandering openly about foliage. Most of the Tenebrionid larvæ feed obscurely on vegetable matter, preferably in a dry condition; probably the best known, in domestic economy, is *Tenebrio molitor*, the famous meal-worm, which I have occasionally had served to me at breakfast in a plate of porridge.

There are three families of beetle in particular, many of whose members are extremely fond of sunshine. The Elaters or Click Beetles, their next of kin, the Buprestids or Metallic Wood-borers, and the Cerambycidæ or Long-horns.

I have often captured some of the smaller species of Elaters, chiefly of the genus Corymbites, resting on the upper side of leaves, apparently indulging in the luxury of a sun-bath. Early in May two seasons ago I took a magnificent specimen of *Buprestis striata* basking on the tip of a branch of white pine, and in August of the same year I saw darting about in the mid-day heat and settling from time to time on the foliage of a spruce the gorgeous little Buprestid, *Chrysobothris harrisii*. This dazzling vision in peacock blue was vouchsafed to me for a moment only and then withdrawn, but in my mind's eye I have been "following the gleam" ever since. Altogether that proved a red-letter day in my calendar, for I captured on the trunk of a newly-felled balsam fir at the same spot my sole specimen of *Monohammus marmorator*.

A great many of the Cerambycidæ or Long-horns are fond of this sun-basking: and I have made occasional captures on foliage of species that usually seek the shade: once a specimen of *Callidium antennatum* on a blade of grass by the road-side, and once a fine specimen of *Calloides nobilis* on a stalk of sedge by the rail-way track. But of those that are active by day, many of them feeding in blossoms, I have found many species on leaves, especially of the two tribes *Clytini* and *Lepturini;* in one or two cases, the insect seems to prefer one foliage to all others and perhaps such captures ought not to be regarded as merely incidental: for instance, I have found *Clytanthus ruricola* show a decided preference for the leaves of the thimbleberry, though it does not often feed in the blossom of this plant.

The capture I look back upon with greatest pride was that of a small specimen of *Eupogonius subarmatus* in my first season of collecting. I was going through a belt of basswood on the look out for various things, but chiefly "Walking Sticks" and the larvæ of *Chrysomela scalaris*: by "Walking Sticks" I mean the

Phasmid, *Diapheromera femorata,* an Orthopterous insect next of kin to the Praying Mantids; it occurred not infrequently that season about the Rideau on basswood; still more abundant on basswood leaves were the larvæ of *Chrysomela scalaris,* and I was rearing some in captivity. While scanning the underside of the foliage just above my head I noticed a leaf through which the sunlight passed imperfectly; there was a small opaque area near the centre, in short, something rather smaller than a house fly was casting its shadow on the upper surface. I drew the leaf cautiously down and surprised a diminutive longicorn sunning itself in the middle of the leaf; unfortunately, I surprised it in more senses than one, for, in response to a stimulus of self-preservation, it instantly collapsed and, tumbling down the leaf in a series of somersaults, like the clown in a pantomime, disappeared from the stage. For nearly half an hour I hunted among the *débris* at my feet and at last discovered the little harlequin playing 'possum under a twig.

At first I took this beetle for *Amphionycha flammata,* to which superficially it bears an extraordinary resemblance; but I found the ungues or claws (which are divaricate) simple instead of cleft; as they are distinctly cleft in *Amphionycha,* the foot appearing to end in four minute claws, it became certain my capture was *Eupogonius subarmatus.*

Another form of incidental capture is where beetles of a carnivorous habit resort to foliage in search of food. I have once taken *Calosoma scrutator,* and several times *Calosoma calidum* on the foliage of the white pine; these enterprising ground beetles poaching on the arboreal preserves for caterpillars; many of the diurnal fireflies, which are carnivorous, may be found resorting to foliage for the same purpose, and the *Coccinellidæ* or Lady-birds are regularly so taken. One July I found two or three species of Lady-bird resorting in large numbers to an asparagus bed where they were doing yeoman service in devouring larvæ as they fed on the foliage; on the *menu* of their banquet if not the *pièce de résistance* was *Crioceris asparagi,* and they were feasting royally.

Passing from incidental captures to those where the insect was found on its food-plant, I shall begin with an insect I saw in July three years ago which did not devour the leaves, but using its jaws as a pair of scissors, cut them and rolled them up into cylinders. I mean the weevil, *Attelabus analis,* the oakleaf roller.

I was examining the leaves of various plants, herbaceous and woody, along the railway track some 12 miles north of Port Hope—especially willow shrubs and oak-seedlings whose foliage was lush and tender, the leaves being, many of them, still pink and soft—when I noticed a curculio with black head and snout, the thorax and elytra of a shining chestnut red. I recognized it from having seen cabinet specimens as one of the oak-leaf rollers, and on diligent search I found it fairly abundant and always on young leaves, which no doubt proved more pliable and easily worked by this ingenious little artificer. It was not easy to see much work done, as the beetle is easily alarmed and drops from the leaf if approached too closely. I was able in one case, however, to watch the actual process of rolling and in another some of the preliminary work of cutting. Observations published in an American journal of entomology go to prove that though the act is instinctive and involves neither practice nor imitation, it is not absolutely perfect; leaves have been found cut in more than one place and then abandoned as unsatisfactory.

There is a very interesting account of a British leaf-roller (*Rhynchites betulæ*) given by Sharpe in the Cambridge Natural History. The female beetle goes to the margin of the leaf—at the base, but some way out from the stalk—and cuts through the leaf from the margin to the mid-rib somewhat in the shape of an upright letter S; it then crosses the mid-rib and cuts through the other half

of the leaf to the margin somewhat in the shape of a prostrate letter S. The beetle then returns to the margin where it began cutting and, much as a grocer makes a paper funnel for sugar, rolls the edge over round an ideal axis till it brings it to the mid-rib; here it holds the funnel in position with the legs of one side while, with the other three, it draws the further side of the leaf towards it and wraps it around the part of the funnel already formed. When it finds the material stiff to work with it bites the surface of the leaf with its mandibles or pushes it into position with its feet, adjusting means to ends like a sailor at work in the shrouds furling canvas. It then enters the funnel, bites two or three small pits into the leaf, deposits an egg in each and then emerging completes the funnel by folding over and tucking in the tip of the leaf.

Mr. Sharpe, in comment, points out that the insect has never seen a funnel in its life and yet manages to make one perfectly the very first time of trying. But the author's perplexity is partly due to his confusing a purely instinctive act with an act of intelligence (*vide* the Peckhams' book on Wasps). How can an insect be a highly-skilled engineer, working with mathematical accuracy and on a scientific plan? It is an insoluble problem if you try to state your answer in terms of intelligence and individual consciousness. But place it among impulsive acts, involuntary and more or less mechanical, common to all members of the species, and you can give a fairly satisfactory explanation in terms of instinct.

Among insects especially are found instincts whose perfection is simply diabolical, often involving a highly complex series of acts performed but once in the whole life-time of the individual and therefore admitting of neither practice nor imitation. To look upon such acts as the result of conscious intelligence is absurd; the intellect has no place here and would be simply a meddler, likely to bungle and make a botch of the artificer's work. On the other hand a whole-hearted Darwinian like Weismann has no difficulty in applying his great principle of selection to such an act and seeing in it one more beautiful illustration of how all things living in the world, whether flora or fauna, are adapted to their environment.

As I have begun with one of the weevils, which come at the end of the Coleoptera in classification, I shall pass to a family not far removed from the weevils, the Blister Beetles (*Meloidæ*), many of which in the mature state occur abundantly on foliage and are very destructive. Four species of the genus *Epicauta* are known in Ontario; some of them occasionally attack the leaves of the potato, but more usually they feed harmlessly on flowers like golden rod and helianthus or the low herbage by river banks. I have not seen any of this genus and think it uncommon east of Toronto, or at least in the neighborhood of Port Hope. One species of an allied genus (*Macrobasis unicolor*), which also attacks the potato, I have found in great abundance about Port Sydney in low grounds feeding and breeding on the foliage of meadow-rue. The family consists of two tribes, *Cantharidae* and *Meloidae;* the former all have power of flight and are frequently found about foliage or flowers; in the latter the wings are abortive or entirely absent, and the beetle's most daring excursion into the realm of air consists in crawling up a grass-blade or the stem of some herbaceous plant. One or two species of *Meloe* or Oil-beetle are frequently found early in the spring and late in the summer, but the insect does not appear to eat foliage. Both tribes of this family are famous for their possession of a principle known as cantharidine, whence they are called Blister beetles, some of the species being of great medicinal value.

A more remarkable feature about them which they share with some of their neighbours. the *Mordellidæ,* is the phenomenon of hyper-metamorphosis. They

are all parasitic in the larval stage, their hosts being usually bees, occasionally wasps and (in the case of *Epicauta*) locusts. The normal form of the larva is preceded by a very active louse-like insect known as a triungulin (each leg terminating in a triple set of hooks). The larva that succeeds the triungulin is inactive and almost legless; moreover, in some cases the true pupa is preceded by a sort of preliminary pupal form from which emerges a larva of habit almost as active as the original triungulin, though it does not feed.

The triungulin is a monomaniac; I mean a creature of but one idea, one single goal of ambition, and its six active legs enable it to get there. The loadstone that draws the triungulin like a steel-filing to a magnet is the egg of its host. In the case of *Epicauta vittata* this is the egg cluster of a locust, and the parent beetle takes the precaution of laying its eggs near where the locust has hidden its egg-batches in the ground. Among the Cantharids whose host is a genus of bee (*Anthophora*), the beetle oviposits near the bees' nest, but in order that the triungulin may reach the egg of the bee, it has to be carried into the nest by a queen bee; its instinct impels it to seize the first hairy object within reach. This frequently proves to be the leg of a drone and in some cases the triungulin manages to transfer itself to the leg of a queen bee during the nuptial flight and so reaches its goal, the egg-cell in the hive. But hundreds of triungulins must perish from seizing a wrong object, and in order to compensate for this, selection has enormously increased the fertility of the female beetle, which lays as many as 2,000 eggs. In the *Meloe* or Oil-beetle the instinct is even more imperfect; the beetle does not lay her eggs near the home of the host and the triungulin mounts to the top of grass stems or enters a blossom and waits there for a hair (any hair will do); this more often than not proves to be growing on the leg of a fly, or if a bee, the wrong kind, and thousands of the triungulins, instinctively seizing the first hairy object that offers, are carried into space to perish miserably. All that saves the *Meloe* from utter extinction is the stupendous fecundity of the female, the clutch of eggs laid by this Apteryx among insects producing a brood of no fewer than 10,000 triungulin chicks.

Apart from the great Phytophagous group of beetles, easily the best known family of leaf-eaters is the Scarabæids. One section of this family consists of scavengers pure and simple, the larva being nourished in manure or rotting wood, and the female laying her eggs in such material. But an important branch of the family is phytophagous, the larvæ feeding on living vegetable matter, usually the roots of grasses and herbaceous plants, and the mature insects often feeding voraciously on leaves of trees or soft vegetable tissue.

In this family of beetles, structurally so different from the Phytophagous Beetles, strictly so called, it is interesting to note how far one group has diverged from another in response to conditions entailed by their chosen food material. Among the *Coprini* you find the larval stage completed in a few weeks or at most months, while the life of the mature beetle (as in Scarabæus) extends over a period of two or three years. Among the *Melolonthini* almost the converse obtains; the larva takes two, three or even five years to mature, and the beetle, after emerging from the ground, lives for only a week or two.

In Ontario the most familiar of these phytophagous scarabs are the leaf-chafers popularly known as June bugs. After three years passed in subterranean obscurity the beetles emerge, often in vast quantities; they are inactive during the day and remain hidden in the grass at the foot of trees or on the foliage itself, but at dusk they rouse up from their lairs and fly about among the trees in irregular flight, noisy and blundering: before midnight their activity on the wing ceases.

The life of the individual beetle after emerging from the ground lasts little more than a week or two, and you would naturally expect its chief concern to be the perpetuation of its kind.

But often Melolonthinus, like Launcelot Gobbo, is a huge feeder, sometimes entirely stripping fruit trees and ornamental shade trees of their foliage. There are one or two genera in this group containing species a good deal smaller than *Lachnosterna,* the true June bug, which are also very destructive in some parts and seasons. The Rose-chafer (*Macrodactylus subspinosus*), not content with eating the buds and petals of rose blossoms, frequently attacks the grape-vine and the foliage of various fruit trees; it is also sometimes a pest on young corn; it does not seem so far to have made its way east of Toronto in any serious numbers.

A closely allied genus is the *Dichelonycha,* one species of which (*D. elongata*) I have often seen eating the foliage of basswood. Three seasons ago it was very abundant in the woods near Port Hope, and responsible for a good deal of damage done in July to the foliage of forest trees; it shows a decided preference for basswood, eating its foliage more readily and more rapidly than other leaves, though I have found it on hawthorn and on maple.

Another genus, that of *Hoplia* (*trifasciata*), occurs often on hawthorn leaves, but it is almost entirely a pollen-feeder like *Trichius piger* and *Euphoria inda. Hoplia,* which occurs often on choke cherry, early elder and hawthorn, the males appearing at the beginning of May and the females a fortnight later, disappears at the beginning of June. Another species of *Euphoria,* a beautiful beetle, called *E. fulgida,* I suspect of eating forest leaves; I have picked it up several times under trees in open rocky hardwoods on the north shore of the Rideau.

Among Scarabs that frequent foliage are also two species very destructive in the tribe *Rutelini,* large handsome beetles—*Pelidnota punctata,* found on grape-vines, and *Cotalpa lanigera,* chiefly on pear trees, but occasionally on elm, poplar and oak. I have never found this beetle, but the *Pelidnota* has been taken occasionally in the neighbourhood, usually on the cultivated grape-vine, but once or twice on wild vines, some miles north of the town; it does not appear to be at all frequent east of Toronto.

I mentioned at the outset of my paper the Buprestids as a family peculiarly fond of basking in the sun. There are two genera of Buprestid that eat leaves, *Agrilus* and *Brachys.* The first of these is a long, narrow beetle, taken occasionally on the leaves of basswood, but more common on the foliage of raspberries. The larva bores in the stem of the raspberry. A curious feature about the Agrilus is that in appearance and shape, as well as in some of its movements for escape or to elude observation, it closely resembles the longicorn beetle Oberea; moreover, the habits and life-history of the two beetles are almost identical; they both lay their eggs in raspberry stems, where the larva bores and feeds, and they both in maturity resort to the leaves of the plant as a resting place and occasionally for food.

The genus *Brachys* is a short form of beetle, almost as broad as it is long, the species I have most commonly found being *Brachys ærosa;* it is not uncommon on basswood and two or three other forest leaves, but I have usually found it feeding on the foliage of a hazel (*Corylus rostrata*), where it is sometimes abundant. It is stated in Sharpe's article on insects in the Cambridge Natural History that some of the smaller kinds of Buprestid have been discovered to feed on the parenchyma of leaves. I know nothing about the larval habit of *Brachys,* but arguing on analogy from *Agrilus,* I would hazard the guess that the larva is a leaf miner on hazel or other forest leaves.

In drawing a parallel between *Agrilus* and *Oberea* I referred to both form and habit. The form of *Brachys,* short and broad and somewhat flat, suggests the form of *Odontota,* a leaf-miner among the *Chrysomelians;* in habit, since the mature beetle of *Agrilus* responds to the same food-stimulus as its larva, the eating of hazel and other leaves by the *Brachys* beetle may mean that the larva mines in such leaves. (*Vide* Can. Ent., 1887, xix, 159.)

I have found a great many instances among the Coleoptera where the mature insect seems to be affected in a greater or less degree by the same stimulus as the larva. Perhaps the sight of the larva's food-plant strikes on some happy chord of childish recollection in the mature beetle.

To the student of animal instinct it is no doubt far more wonderful that an insect in its comparatively short life should at different stages respond to two quite distinct food-stimuli. The syrphus fly (*Eristalis tenax*), whose larva feeds in liquid manure, is at maturity a honey-sucking haunter of blossoms; in extreme cases, like that of the parasitic oil-beetles, as many as three distinct food-stimuli occur in the life of the individual.

But in my rambles through the realm of Coleoptera, it is the opposite phenomenon which has struck me most. I mean the number of beetles that are attracted to the food of their larva. I have noticed this especially among the Cerambycidæ. In many of them the smell of fermenting sap (where a tree is newly felled or has been injured by the lopping of branches or the mutilation of bark) seems to act as a direct and powerful stimulus in liberating the instinct of reproduction. This is specially noticeable in the Monohammi. In others, again, where perhaps the smell of sap has first drawn the insects to the tree for breeding purposes, the sight of the foliage seems to impel the beetles to eat the leaves. This is particularly the case in some genera that approach most nearly to the Chrysomelians. We have a familiar illustration of it in *Tetraopes,* the Milkweed beetle, whose larva feeds in the stem of the plant while the beetle resorts in large numbers to the leaves, on which it feeds freely as well as breeding. Less conspicuous examples of the same phenomenon are the *Oberea,* and still more the *Saperda.* I have several times captured *Saperda vestita* feeding on the sheaf of leafy twigs surrounding the basswood stumps, under whose bark the eggs are laid. I have found *Saperda moesta* eating the leaves of the poplar, where its larva develops, and on a single willow I once counted over 200 specimens of *Saperda concolor* breeding on the leaves and eating the foliage with evident relish.

These last few paragraphs have brought me right into the great group of Phytophagous beetles, properly so called; whose larvæ, without exception, find support on living vegetable tissue. They comprise three families, the Bruchids which devour seeds, the Cerambycids which attack the woody tissue of trees and shrubs, and the Chrysomelids which feed at all stages on foliage and the more succulent parts of vegetation.

The Bruchids form only a small group, and the genus *Bruchus* is the only one of much importance; besides the Pea and Bean Weevils (so called), the only species I have found at all abundant is a minute insect, *Bruchus discoideus,* sometimes plentiful in the blossoms of the white convolvulus or Morning Glory.

The Cerambycids appear to have been in their origin scavengers, rarely attacking sound wood; but the larvæ of many of them, before reaching full growth, eat right into solid timber; while others appear to eke out their existence by draining the afflux of sap to the part they have wounded; yet others again have deserted the forest tree that formed their ancestral home and taken up their abode in the fruit trees of our orchards. The larvæ develop slowly, and must greatly reduce

the vitality of the tree they infest. They are exceedingly tenacious of life, and many instances are on record to show that the larval stage is capable of enormous extension.

The imago of *Monohammus* has been known to emerge from chairs and tables years after the manufacture of the furniture. Mr. C. O. Waterhouse, an English naturalist, heard one of these larvæ at work in a boot-tree (an implement for stretching top boots), which he had in his possession for 14 years; he then presented the implement to the Natural History Museum at Kensington, where for 6 or 7 years longer the larva continued to saw wood. The entire absence of sap had, of course, arrested the development of the larva, and it was unable to complete its transformation. Sereno Watson, the American botanist, relates another case (Packard, U. S. Ent. Comm., 1890, p. 689) that seems to prove the life of one longicorn to have lasted 45 years. When you add to this tenacity of life the larval obscurity which makes even detection difficult, it will be seen how serious a pest the longicorns may and often do become.

The Chrysomelians, on the other hand, live openly on foliage, which they devour as beetles no less than as larvæ. The larval stage is short, and the insect, as a rule, helpless and easily destroyed. They more than compensate, however, for their exposure to attack by their rapid breeding, many genera producing two broods every season. There are 11 tribes of the family in boreal America, all of them represented in Ontario. But the great bulk of our Chrysomelidæ belong to the four consecutive tribes—*Cryptocephalini, Eumolpini, Chrysomelini* and *Galerucini;* the last of these is far the greatest, and contains more genera and almost as many species as the other three combined. Together these four tribes contain more than two-thirds of the entire genera and species in the family.

As, geologically, the woody fibred vegetation preceded the leafy and succulent plants, it is probable that the Cerambycidæ attained their greatest development far earlier than the Chrysomelidæ. But the two families are undoubtedly closely akin, and the Donacias may be regarded both in form and in habit as in many respects intermediate between some of the less highly specialised genera of Cerambycids and the Chrysomelids.

THE POOL.

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Within an easy distance of my present place of abode there is, in the landscape, an abrupt descent, clothed with forest trees, and extending for a considerable distance.

Such a descent would have been called in England, in the olden times, a "hanger."

In that delightful book, "White's Natural History of Selbourne," such a hanger is described; and the word itself is found in the names of places, such as Oakhanger, Westonhanger, etc.

It may be that the appellation is an Anglicised form of the Norman French *hangar,* a shed—a word common in Quebec Province, but almost obsolete in England. Thackeray, however, makes use of it in his "Life of Henry Esmond."*

At a spot under the elevation I have in mind, the Trenton limestone of the

*"Mademoiselle, may we take your coach to town? I saw it in the hangar, and this poor Marquis must be dropping with sleep."—*The Hist. of Henry Esmond.* Bk. III., Ch. 13.

district crops out, around a hollow some yards across and always containing water. A projecting slab on the edge of the pool affords me a welcome place of rest. When I am seated upon it, my attention is naturally drawn to the creatures inhabiting the limpid water at my feet. I have found them a numerous and interesting assembly.

One day, early in June, I noticed a number of Newts (specimens of *Diemyctylus viridescens*), asprawl, and motionless on the bottom of the pool. Presently a small fly, either by accident or design, touched the water: immediately one of the newts, that had seemed so inert, rose to the surface and swallowed it. The propelling guiding powers of the newt were in its tail. A few undulations of this, and the creature ascended directly to its mark—its feet hanging motionless by its sides.

I much desired to examine the newt more closely; but how was I to secure it without injuring it? I called to mind that when I was a boy in England, I made a visit to friends in Surrey; and my young companions there took me to a pond to shew me how to catch "effets"—those formidable, saw-backed creatures that bear the name of *Triton cristatus*.

Fig. 1 *Diemyctylus viridescens*. Natural size.

My friends took with them a stick, a piece of string, and some worms. On reaching the pond they fastened one end of the string to the stick, and tied a worm by the middle to the other, and then dangled the bait before the eyes of a Triton. The little reptile seized it with the greatest avidity; and, so tenacious was its hold, that it allowed itself to be lifted from the water, and landed on the bank, without relaxing it.

I tried this plan with my newt; but it was a failure—the creature would not bite. It wriggled away. But a handsome Leopard Frog—cream-breasted, green-coated, and adorned with jet-black markings—which was sitting near with its head out of water—could not resist the lure, but swallowed it incontinently. I tightened the line to see if the frog would allow itself to be drawn from the water. It sat, as Mark Twain's "Jumping Frog" sat, after the shot had been poured into it; but it let the worm come from its maw with a slobbering gasp.

It may have been imagination, but I thought that a look of astonished disgust passed over the visage of the frog.

While I was considering how to secure a specimen of the newt, a mosquito lit upon my knee, and proceeded to present its little bill; but I brought a weighty argument to bear upon it, and put it out of occupation. I pitched its remains

upon the water. expecting to see a newt rise to them; but instantly a hungry Water Strider (*Hygrotrechus remigis,* Say) seized them and glided away. At the same instant another newt rose to a fly. I had my Entomological net in my hand, and, on the impulse of the moment, I slid it into the water and caught the reptile.

What a beautiful little creature it was! Its back and sides were olive green; its under parts chrome yellow; and it was dotted all over, down to its toes, with jet black spots. In a row, on either side of its body, were some oval spots, crimson-lake in colour, and each inclosed by a black ring. Its tail, set edgeways, was broad and thin, and as long as its body. It moved with easy grace. I took the little creature home with me, made a drawing of it, and then carried it back to its companions in the pool.

The newts all disappeared at the end of July.

The Water Strider deserves our attention. It is a wonderful object. It stands and moves *upon* the water: its body does not touch the surface. Do you want a proof of this? It is before us. Notice on the rocky bottom of the pool, the little cluster of six black spots, that moves as the insect moves above. It is a group of shadows from the creature's feet. There is no shadow from its body—the light passing under it and the sheen on the water cut off that—but the feet, being in actual contact with the surface, cast their shadows below.

How can the Strider stand and walk upon the water? The length of its limbs, and the adjustment of its weight, enable it to do so.

A needle dropped lightly on still water will float; but a shot of the same weight will sink instantly.

If you place the living Strider upon water in a basin, it will at first dash about wildy, for it is possessed of an excess of energy; but, if you remain motionless, it will soon quiet down; and then, strange to say, you will easily perceive that at each foot the water is slightly depressed—the surface is not broken but bent in. The long legs of the insect stretch out like rays, and its body is suspended between them, distributing its weight to six points. It weighs barely one grain—I have had it carefully weighed by a chemist's scales—so one-sixth of a grain only impinges at one point upon the water (or one-fourth, when the insect is employing its front legs against its prey), but this is sufficient to cause a slight depression.

The dimensions of the Strider are as follows:—Length of body, 15 millimetres; breadth, at widest part, 5mm.; thickness, at thickest part, 3mm.; length of antennæ, 6mm.; length of proboscis, 3mm.

Front Legs: Length of femur, 5mm.; length of tibia, 3½mm.; length of tarsus, 2mm.

Middle Legs: Length of femur, 10mm.; length of tibia, 8mm.; length of tarsus, 4mm.

Hindmost Legs: Length of femur, 8mm.; length of tibia, 6mm.; length of tarsus, 2½mm.

These further particulars may be interesting:—The legs are densely clothed with short bristles—these, stretching backwards, must aid the creature's movements. The tarsi are two-jointed, and terminated with sharp claws. The antennæ have four long joints (that next the head being the longest), and a ring-joint between the second and third. The eyes are jet black, closely reticulated, and so prominent that they seem to be starting out of their sockets. The front legs are much stouter than the others and are formed for clasping—they are weapons of offence. The body beneath has the appearance of fine glossy leather.

The Striders are cannibals. I saw one of them leap upon a smaller relative,

grapple fiercely with it, clasp it tightly to its chest, and then drive its proboscis into its body—the victim soon succumbed.

While sitting by the pool I learned, with other facts, that wasps resort to the water to drink. I do not think that this should occasion surprise, for the mastication of wood pulp, for the construction of their nests, must be thirsty work for the wasps.

At the edge of the pool some broken pieces of rock had fallen in, and a little water found its way between them. I saw a specimen of *Vespa diabolica,* Sauss, alight on the edge, walk down to the water, take a drink, and then fly away. Soon a second came to the same spot, and did likewise. Then there was a flash of brighter yellow; and a very bustling object came on the scene, and took the same course. I caught this insect to make sure of its identity—it was *Vespa germanica,* Fabricius. Soon afterwards a fourth insect, a specimen of *Polistes pallipes,* St. Farg., came to the same place for refreshment. No doubt all these wasps had nests not far away, and that this drinking-place was one of common resort for them.

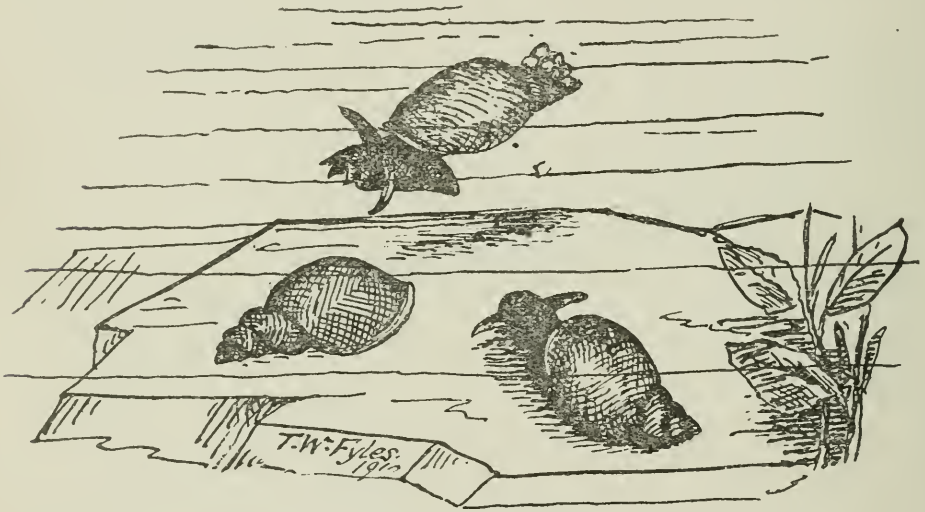

Fig. 2. Water Snails.

Another species of the wasp that frequented the pool was the Mud Wasp, *Pelopæus cementarius,* Drury. It came to gather material for the construction of its—we may well say—*orphanages.* These are built of mud, in snug nooks of houses, or other buildings. They consist of cells—each of about the capacity of a pea-nut—closely packed in masses which are smoothed on the outside. Before closing up a cell, the mother wasp fills it with spiders paralyzed by its sting, and drops a solitary egg amongst them. The mud castle contains no chamber for its builder—she soon dies.

Clinging to the rocky sides and bottom of the pool, I found a number of Water Snails, belonging to the genus Limnæa. Their shells appeared larger than those of *Limnæa palustris,* and not so large as those of *Limnæa stagnalis.* The snail itself was an ungainly object, dull black in colour, and with flat horns, the shape of brush-scythes. These probably aid the creature to steer its course in the water, when it loses its foothold.

Of Water Beetles three kinds were to be seen in the pool, viz.:—*Colymbetes sculptilis,* Harris, *Dytiscus fasciventris,* Say, and *Acilius fraternus,* Harris. *Gyri-*

nus borealis, Aubé, which was very abundant in a neighbouring stream, was not to be seen in the pool.

On one of my last visits to the pool, I drew from the bottom of it a broken limb of a tree that had lain there, water-logged, for the whole season. Attached to the under surface of this piece of wood, I found a strip of some kind of spawn. It was three-quarters of an inch long and about three-sixteenths of an inch thick, and so firm that I was able to loosen it from the wood without damaging it. It was translucent, and I counted in it sixty minute eggs. I placed it in water, and shifted it to fresh water frequently. The jelly-like matter surrounding the eggs, whether designed to nourish or protect them, gradually dissolved, and the eggs became free. At this stage the embryo, curled round within the egg, could be easily seen with the naked eye. The eggs began to hatch in the beginning of the present month (November). This is a description of the larvæ in their first stage:—

Length, two millimetres. Translucent and colourless throughout—except that the tips of the mandibles were ochreous and the eyes were small brown dots. The head was large in proportion to the body. The antennæ were straight and tapering. The thoracic segments were slender, and angulated where the limbs were attached. The femora—especially of the hindmost pair of legs—were remarkably large. The segments of the somewhat enlarged and flask-shaped abdomen could be easily counted. At the end of the body were two respiratory tubes.

Were these the larvæ of *Dytiscus fasciventris,* Say?

On August 3rd an American Bittern (*Botaurus lengtiginosus*) flew up as I approached the pool. I think the bird was merely a passing visitor, for, in my frequent walks around the spot, I did not see it again.*

One day in September, while occupying my favourite seat by the pool, I became aware of a dozen heads protruding from the water, and a dozen pairs of eyes fixed intently upon me. The position struck me as ludicrous, and I laughed aloud. Immediately a dozen pairs of heels turned up with a splash, and my interviewers disappeared. In less than five minutes they showed themselves again, and resumed their watchful gaze, as much as to say, "What will you do next?" They were half-grown Leopard Frogs.

I made the acquaintance of these creatures early in May, when they were dirty-brown tadpoles, about the size of our hazel nuts, and possessing long tails. They developed hind-legs in the beginning of July, and, before the end of that month, had absorbed their tails, and become possessed of fore-legs.

About the time of their metamorphosis, the full-grown frogs disappeared from the pool: they were gone probably in search of land adventures; for their kind were plentiful in the low-lying meadows near.

Not the least interesting of the frequenters of the pool were the Dragon-flies.

The first of these to attract my attention was *Tetragoneura canis,* MacLachlan. I had not met with it previously, and am indebted to Dr. E. M. Walker for its identification. The following is a brief description of it:—

Tetragoneura canis, MacLachlan: Length of body 1⅝ inches; expanse of wings, 2 3-8 inches. Colour brown. Face and thorax hairy, with a white gloss. On either side of each segment of the abdomen there is a clay-yellow patch. Abdomen somewhat spatulate, widest in the middle, tapering towards the end. Venation of wings pale brownish red. Stigmata dark brown. At the base of the secondaries are some small brown blotches.

*On the 10th of June, 1904, I found a Bittern's nest containing three eggs, at the "Gomin," near Quebec. It was merely a depression in the herbage. The eggs were 1 7-8 inches long and 1 7-16 inches broad, of a pure oval, and fawn-coloured.

In the course of the season the pool was visited by representatives of the five species undermentioned:—

Basiæschna janata, Say.
Libellula quadrimaculata, Linneus.
Libellula pulchella, Drury.
Plathemis trimaculata, De Geer.
Æshna umbrosa, E. M. Walker.

The last named was a particularly brilliant object. It was seemingly set with jewels. It flashed in the sunshine with the glories of emerald, sapphire, and topaz. It hovered over the pool, as a kestrel hovers over an English meadow.

The whole scene in the bright autumn days was very lovely. The Golden Rod grew thickly around, its colors relieved by the blue of the Michaelmas Daisy. Here and there a clump of the Glaucous Willow gave an air of seclusion to the spot; and a few yards away the stately forest trees ascended, with foliage already tinged with russet, crimson, and gold.

It was a spot in which the contemplative man might hold communion with his Maker, and muse upon all His works, and "rejoice in giving praise for the operations of His hands."

On October 17th—the day being bright and warm—I visited the pool again, but could detect no living thing within it. All its frequenters had lived out their lives, or sought their winter retreats.

The ground was covered with dead leaves, brown and sear; and silence reigned —*"Sic transit gloria mundi."*

THE BEAN MAGGOT IN ONTARIO IN 1910.

J. E. Howitt, M.S.A., Ontario Agricultural College, Guelph.

It was the writer's privilege and pleasure to attend the inaugural meeting of the Bean Growers' Association of Kent County, at Ridgetown, in May. At this meeting the fungus diseases and insects injuring beans were discussed at some length. During the discussion many of the growers asked about a little white "weevil" which they claimed was their worst insect pest. Most of them had the idea that it was the bean weevil, but, from the descriptions given of it, the writer came to the conclusion that the pest was not the bean weevil. It was, however, impossible to say what the insect was from the accounts given by the growers at the meeting. An arrangement was, therefore, made for the Biological Department of the Ontario Agricultural College to investigate the insect and fungus diseases of beans which might become prevalent in Kent County during the summer of 1910.

About the 10th of June word was received at the College that "the little white weevil" was doing serious harm in Kent County. Many fields of beans had failed to germinate properly owing to the ravages of the pest. On June 21st the writer went down to Ridgetown, in Kent County, to investigate as fully as possible the cause of the trouble. At Ridgetown Mr. W. E. Galbraith, President of the Bean Growers' Association, met the writer and a start for a trip of inspection was made. The farm of Mr. Galbraith was first visited. On looking over the bean fields, here and there in the rows were seen plants which were little more than blackened stubs. The plumule and cotyledons had come above the ground, then withered and discolored. When some of these stubs were examined the coty-

ledons were seen to have little holes eaten in them, usually many holes in a single cotyledon, and very often the plumule had a little hole bored in it from above downwards for a short distance, less than one-sixth of an inch. It was quite evident that some insect had done the damage. Many of the other plants in the rows which were more advanced in growth were also noticed to be unhealthy and dying. The first pair of true leaves were limp and hanging down around the stem, instead of erect and spread out in their natural horizontal position. On digging up some of these plants a discolored hole was noticed in the stem usually just above the root, but sometimes in the root. When these stems were cut open they were found to have a little tunnel running up through the centre, and at the end of each tunnel a little white maggot was usually found. These maggots were evidently killing the plants by boring in the stems.

At the next farm visited a field was examined in which the beans had failed to germinate properly. Only a very few plants had come up in the rows and the owner was about to resow the field. The beans in this field had been planted just before a cold rainy spell lasting about three days. On uncovering some of the beans it was found that they were badly eaten by the same little white maggot that had been found in the stems. Half a dozen or more of the maggots were often found feeding upon a single bean. They were generally beneath the seed coat and between the cotyledons. Many more bean fields were examined and in all the maggots were found in greater or less numbers. Sometimes the seeds had been so badly eaten that they had failed to germinate, but in many instances though the cotyledons had been attacked by the maggots, the seed had germinated and pushed the damaged cotyledons above the ground and the plants appeared in the rows as discolored stubs. Though the maggots caused many blackish stubs in the rows and killed many of the more advanced plants by boring in the stems, the chief damage done by them was undoubtedly the destruction of the seed in the ground, making replanting necessary. The writer was informed that in some seasons many hundreds of acres had to be replanted on account of the work of the maggots.

While looking over one of the fields a large number of small flies were noticed hovering over and lighting on the bean plants. Suspicion was at once aroused that these these flies were the adults of the maggots. After some little trouble a number of them were captured and put on one side for closer examination than could be made in the field. At the same time a large number of the little white maggots, with the beans they were feeding on, were collected and placed in tin tubes and covered with a little moist earth.

The maggots were collected on June 21st, and on June 23rd, the day the writer returned to the College, they were all removed from the tubes. They had not apparently suffered from their journey, as they all seemed active and healthy. Two lots of the maggots and beans were put in large glass vials, the mouths of which were closed with plugs of cotton batting. A third lot was placed in a pot of moist sand in a breeding cage. On June 25th it was noticed that four or five of the maggots in the vials had pupated, and by June 27th practically all the maggots had transformed. On July 4th two flies emerged in one of the vials, and a week later it was found that flies had emerged from nearly all the pupæ, both in the vials and in the breeding cage. These flies appeared to be identical with those taken in the fields near Ridgetown. In order to make certain as to their identification some of the flies taken in the field and some of those bred in the vials were sent to Professor Coquillett of Washington, who identified both lots as *Pegomya fusciceps*, the adult of the seed corn or bean maggot.

The seed corn or bean maggot (*Pegomya fusciceps*) has been known for years as a destructive pest of seed corn and of beans. In the Entomological Society Report of 1900 Professor Lochhead mentions this pest among the insects of the year as doing serious harm to beans in Lambton County, Ontario. In Kent County, according to the reports received by the writer from the bean growers, it is by far the most serious insect pest of beans. Up to the present time the growers have apparently not known exactly what it was, nor have they had any exact knowledge of its life history, habits, or measures for its control. A brief account of these is, therefore, given here.

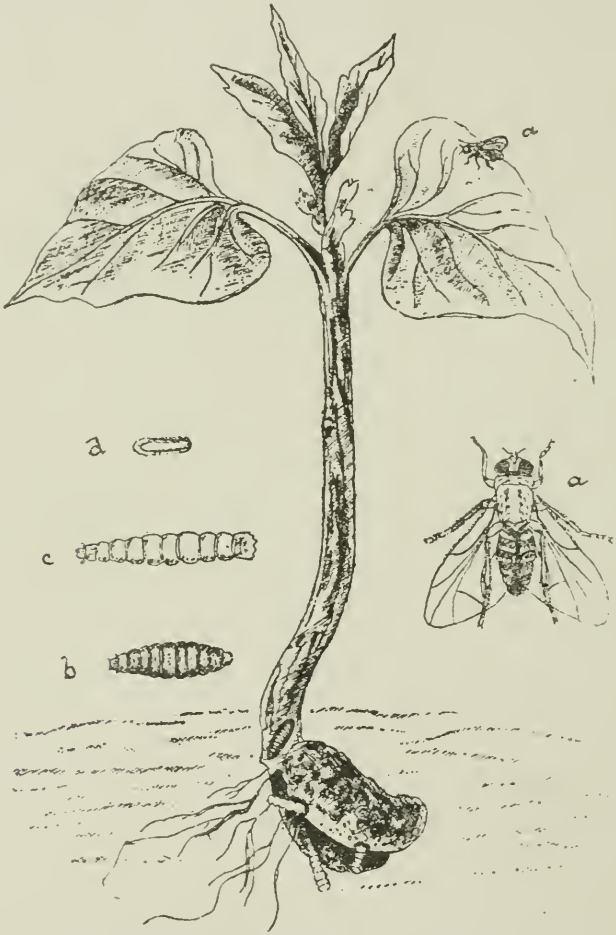

FIG. 3 The Bean-Fly—(*a*) adult fly, (*b*) pupa case, (*c*) maggot, (*d*) egg.—After Lugger.

DESCRIPTION.—The parent fly of the bean maggot looks very much like a small house fly. The maggots are white or yellowish white in color, footless, cylindrical in form, tapering towards the head, and about one-third of an inch in length. The puparia are light brown, barrel-shaped or elliptical in outline and about one-fourth of an inch in length.

LIFE-HISTORY.—It is thought that this insect passes the winter as the fly or pupa. In the spring the flies lay their eggs on decaying matter in the soil, and, when the maggots hatch, they find their way to the seed beans or seedling plants.

After the maggots cease feeding they change to the puparia from which the flies emerge in about two weeks. It is probable that there are two broods each season in the bean fields in Ontario.

Means for Control.—While investigating this pest in Kent County the writer found that in every case where the maggot had done serious harm its presence in large numbers could be accounted for by one or other of the following conditions: Planting the seed just before a prolonged cold rainy spell, planting the seed too deeply, the heavy application of farmyard manure, or the neglect to follow the usual three years' rotation of crops. Means for control are, therefore, chiefly methods of prevention. Planting the beans at the right time and at the proper depth in order to insure a quick start seems to be one of the best means to prevent the ravages of this pest. Anything which retards germination, such as cold wet weather shortly after planting, or covering the seed too deeply, gives the maggots a chance to get started in the seed and to prevent its proper germination. As the eggs are deposited in decaying matter the application of farmyard manure increases their number, and the substitution of commercial fertilizers is often advised but not always practicable. If the maggot becomes very serious in a field, it will often be advisable to stop growing beans in that field for a number of years, in order to get rid of the pest.

THE HORSE-RADISH FLEA-BEETLE (*Phyllotreta armoraciae,* Koch).

A. F. Winn, Westmount, Que.

About the middle of May last I purchased at Bonsecours Market, Montreal, a few roots of horse-radish, which I cut up and planted. In due course they began to put up their leaves.

Early in June, when the leaves were only four or five inches long, holes appeared, evidently the work of flea-beetles, but as it was the first time I had grown the plant, I did not know what species was likely to be the culprit. A glance showed the beetles in abundance, and also that they were something quite new to me.

They were about 3 mm. long, oval, and very convex. Head and prothorax black, elytra creamy white with a black sutural stripe, broadest in the middle, and a narrower black marginal line. Both prothorax and elytra dotted over with punctures. Many of the beetles were mating.

There was no difficulty in identifying the insects, as in Insect Life, Vol. vii., pgs. 404-406, 1895, there is an article by Mr. F. H. Chittenden giving an excellent figure and an account of its first captures in the U.S.A., at Chicago, Ill., and Guttenburg, Iowa. Whether this well-known European species has spread to the districts about Montreal overland eastward from Chicago, or whether we have had a direct immigration via the St. Lawrence route is a question, but not a very important one, as the fact remains that it has settled down in Canada, and will have to be entered among our insects injurious to vegetables. It seems remarkable that these little beetles could find my new plants so quickly and in such numbers. Doubtless someone within a few blocks of our house has been growing horse-radish, and has been harbouring a rather interesting beetle, perhaps for several years, all unknown to the Montreal Branch of the Entomological Society of Ontario.

Towards the end of June a plant of horse-radish was noticed by the roadside about a mile from my house, and on examination was also found to have its leaves riddled with holes, and scores of beetles were ready to hop off when approached too closely.

Although our common species of Phyllotreta, *P. vittata,* has a wide range of food plants among cruciferous plants both wild and cultivated, *P. armoraciæ* seems to have restricted itself to the horse-radish (*Nasturtium armoracia*) and marsh cress (*Nasturtium palustre*). If it should develop a liking for cabbage, it will be able to find an abundance of food in this part of the Island of Montreal. There was no sign of either eggs or larvæ on leaves or stems of the horse-radish plants at any time during the summer; if the larvæ attack the plants they must do it below ground among the roots.

THE MIGRATION OF SOME NATIVE LOCUSTS.

Norman Criddle, Treesbank, Manitoba.

We read from time to time, and have done so for many years past, of vast hordes of locusts darkening the sky, as they sweep onward from unknown breeding grounds. How they devastated the crops and ate up every living leaf in any locality they happened to make a stopping place, and in fact left behind a desolate and leafless waste where a few hours previous all had been luxury and beauty. Such is said to be the case, at times, in parts of Africa, India, and certain South American countries. There is, however, no longer any mystery connected with these visitations. Science has explained all that; has discovered the breeding grounds and is doing much to eliminate the injury by guarding against attacks and providing for them when they occur.

We are not, as a rule, apt to associate our common grasshoppers—many of which, however, are true locusts—with those devastating species. In fact of all our many different kinds we usually claim but one as truly migratory, namely the Rocky Mountain Locust, *Melanoplus spretis,* the locust made famous by having a special Commission appointed to investigate its ravages. This species in the past, has done immense damage to vegetation mostly in the United States, but it also invaded a great portion of Manitoba in the seventies, and is specially remembered on account of its having practically swept the Red River Valley clear of vegetation. Since then there have been two minor outbreaks confined to Southern Manitoba, the locusts having evidently flown from somewhere south. In spite of the prevalence of this species in Manitoba, at times, it is very doubtful whether it can be classed as a native, a distinction which, after all, we are not anxious for.

Leaving out *M. spretis* we have still several distructive species. foremost among them being the lesser Migratory Locust.*Melanoplus atlanis,* with several minor lights such as *M. gladstoni, M femur-rubrum, M. angustipennis, M. packardii, M. minor M. bivittatus* and others, all of which are very injurious at times and migrate regularly during the months of July and August.

It is a wonderful thing this migration. Few animals are free from a desire or instinctive stimulus to move to other parts and so spread the species. Plants, also, are constantly doing it by means of their seeds and those that cannot go far by their own exertions, fasten themselves to such as can. and so, as with ourselves, air. land and water are all made use of for the purpose of travel

With regard to grasshoppers, it is strange that their regular periodic movements have been largely overlooked, though no doubt this is partly due to a lack of knowledge as to where to look. At Aweme, Man., where locusts have been troublesome of recent years, one instinctively looks up towards the sun, taking care to get behind some building, or in some way hide the sun's disc and then, if there are any flying, they will be easily observed within a radius of from one to fifteen diameters from the sun.

When a locust has the instinctive incentive to fly, it is said to inflate the air sacks along the side of its body; it then rises with a spiral movement, round and round, higher and higher, until reaching a height of some hundred feet or more and feeling the resistance of the wind it sails slowly away, usually flying with its head facing the breeze if it is at all strong, and gradually getting higher as it moves along with it until it becomes a mere speck of glistening whiteness, when close in line with the sun and invisible elsewhere. When there is no breeze it will return obliquely to earth to await a more favorable opportunity.

That this desire or instinct to fly elsewhere is no sudden impulse is shown by the fact that a locust when disturbed seldom flies any great distance and in fact seems incapable of doing so, while those that are prepared rise easily. Nor is the movement due to lack of food as one often sees them rise in the midst of plenty. No! it is Dame Nature's way of spreading her children over the country and she has taught them through the law of natural selection to go and also how to prepare for the journey.

The migratory season commences soon after the locusts reach maturity, that is when they have passed their final moult, and some three or four weeks before they commence laying eggs. It lasts almost a month. There is not, however, a continual movement, only hot sunny days are chosen and even then the locust is dependent on the wind which not only carries it along but indicates its direction also. The days most preferred are days when the breeze averages some fifteen miles an hour, though lesser winds as well as higher, are used to advantage; locusts seldom fly, however, when the wind is blowing hard.

It is interesting to watch these movements on a gusty day, when calm one moment and breezy the next. Then every fresh gust is taken advantage of and one sees hundreds of locusts rise on such occasions, as if having waited their opportunity. It is the same while looking up towards the sun, one moment will only discover a few, the next a perfect swarm moving at different angles owing to the breeze having slightly different directions at different heights, and so the journeys continue first east, then west, south or north as the wind varies. At night they apparently drop to earth * to infest new neighborhoods or perchance rise and move elsewhere next day. But not all go. Among the Orthoptera especially, nature has made a wise provision. Some are endowed with long wings; these are built especially for locomotion and conveying the insect long distances. Others of the same species have short or rudimentary wings which obliges them to stay at home. So that while the long-winged forms seek new homes, there are enough short-winged brothers and sisters to carry on the family at home and incidentally the work of destruction also.

*It is well known that some grasshoppers travel throughout the night. Such an instance is related by Prof. S. J. Hunter of *Dissosteira longipennis*, and though I have no direct evidence, it is possible that some of the Manitoba species are also nocturnal during the migratory season.

SOME OBSERVATIONS ON THE PRACTICAL IMPORTANCE OF THE STUDY OF PARASITIC INSECTS.

C. Gordon Hewitt, D.Sc., Dominion Entomologist, Ottawa.

This subject of the practical significance of a study of the parasitic species of insects is becoming increasingly important each year, and my reasons for bringing the subject forward are chiefly two, first to reiterate the significance of this study; and secondly, to give an account of a little of the work that we have begun at Ottawa, some of which is a continuation of the work I was carrying on in England. We are all acquainted with the importance of parasitic insects in the natural control of serious outbreaks of injurious insects; so much so, in fact, that the sudden disappearance of an injurious insect which has attained very large proportions is not infrequently attributed to the work of parasites, upon the slightest, and often in the entire, absence of evidence in support of the supposition. Nevertheless we have a very large number of instances on record when such disappearances are due to the enormous increase of parasites. These sudden disappearances of serious outbreaks usually occur when man would be perfectly powerless and on that account, therefore, it is of great importance that we should study, so far as is possible, the course of such outbreaks, with the idea of learning the methods by which control is obtained and a balance regained in a state of nature. This is becoming increasingly necessary. Our own present methods of combatting insect attacks are comparatively inadequate. They are practicable only when the area attacked is not large, where the vegetation makes the expense entailed justifiable and where the insects have certain definite types of life-histories. But take an insect devastating a large area, as the Larch Sawfly has done in Canada in past years, no means could be adopted to control it, the area under attack was too large. Our cut-leaved birches are being killed by the Bronze Birch Borer, *Agrilus anxius,* nothing can be done at present on account of the peculiar life-history and habits of the insect. Many other instances may be quoted of cases similar to these where we are powerless at present to adopt practicable remedial measures. The reason for this is that we know so little. Our knowledge of the natural means of control, the parasitic insects and also the parasitic fungi which under natural conditions frequently obtain control, is still very meagre. One reason for this is, I think, that economic entomologists have been too much occupied in devising sprays and other mechanical means of attacking injurious insects, and the study of parasitic means of control, the natural means of control has been unduly, though on account of instances well-known to all, one cannot say entirely neglected.

The impossibility of using ordinary methods of insect control in the case of the Gipsy and Brown-tail Moths in Massachusetts has resulted in a great stimulus being given to the study of parasitic means of control and I firmly believe that the work now carried on under the Bureau of Entomology of the United States Department of Agriculture under the direction of Dr. Howard, who was responsible for its initiation, is the real beginning of the study and the practical applications of that study of parasitic and other natural means of control. This type of control will increase in importance as the importance of the conservation of our forests, for example, increases, as it is doing year by year.

During the last few years an interesting instance of the value of this kind of work occurred in connection with my investigations upon the Larch Sawfly, *Nematus erichsonii,* in England. I had the pleasure of bringing to your notice last year some

of the results of this work and the different natural means of control which had been discovered were described.* The chief of these was the ichneumon, *Mesoleius aulicus,* Grav., which was found emerging from the cocoons about the same time as the adult sawflies were emerging. In the spring of 1908, during which year the defoliation of the larches was very serious, a beginning was made in studying the course of the chief factor in the natural means of control, namely *Mesoleius aulicus,* and the average number of cocoons parasitized by this insect in 1908 (strictly speaking one should say 1907, as 1908 is the year of their emergence from the hibernating larvæ,) was six per cent. In the following year, 1909, the percentage of ichneumons emerging had increased to twelve and fifteen per cent, showing that the parasites were increasing in number, though not very rapidly, and there did not appear to be any falling off in the abundance of the sawfly. In 1909, I relinquished charge of the English work on coming to Canada. As this investigation was of considerable interest to me and as I was continuing my study of the insect and its parasites, arrangements were made for a shipment of the cocoons collected in the English districts in which the investigations were previously carried on, to be sent to Canada. During the spring of this year the percentage of cocoons parasitized with *M. aulicus* was again counted and to my great pleasure and surprise I found that they had increased to over 60%. This was confirmed, in England, by Mr. J. Mangan, who continued the work on my departure; he found 62% parasitized. What was originally considered to be of theoretical importance only, is now seen to be of practical importance. We know that in about another year the sawflies will be practically controlled by the parasite in those localities so severely infested previously; where trees had been killed by repeated defoliation and the owners were cutting and contemplating cutting down immature timber to save it. This is now unnecessary and Mr. Mangan informs me that in those localities where the sawflies were so abundant previously it is almost impossible to find them. The trees which in previous years had all the appearnce of having been burnt, so complete was the defoliation, this year appeared almost normally green. Other localities, however, were more severely infested, and the Board of Agriculture, I understand, are adopting the recommendation in my paper to which reference has already been made, namely the collection of cocoons from localities where the percentage parasitized is very great and their distribution in localities where the outbreak is first beginning. In this way the practical application of natural means of control is made and we are able to assist nature in gaining this control and to hasten on the control far more rapidly than would be the case if affairs ran their natural course. This accelerating of natural eradicative measures will prevent also the loss of trees which occurs in the natural course of events. Several hundreds of the chief parasites *Mesoleius aulicus* which I reared at Ottawa were liberated there, and some were sent to Algonquin Park.

A further parasite of *N. erichsonii* and which appears to be abundant both in Canada and the United States is a small Chalcid, which Packard was the first to figure as *Pteromalus nematicida,* although he did not describe it. We found this parasite very abundant in some cocoons collected on the Experimental Farm, at Ottawa, in 1909. This year, through the kindness of Mr. Fiske, of the Gipsy Moth Parasite Laboratory, Melrose Highlands, Mass., I was able to secure a further supply of cocoons from Wellesley, Mass., infested with the same parasite, the life-history of which we are now studying, as I believe it is one of the most important natural means of control that we find. It is very easy to get them to oviposit under laba-

*These have already been described in my paper, "The Large Larch Sawfly, *Nematus erichsonii,* Hartig." Journal Board of Agric. (London), Vol. XV., pp. 649-660. 1908.

tory conditions and as a comparatively large number of eggs are laid in each cocoon, it should be possible to breed this parasite in large numbers. This work is still in progress but I have a number of drawings of the parasite in different stages which may be of interest, and I think that one of the most important functions of these meetings is to report and discuss work that is being carried on, as such discussion is frequently of the greatest value to the investigator.

(Specimens and drawings were passed round.)

THE COCCIDÆ OF CANADA.

Prof. T. D. Jarvis, O. A. C., Guelph.

Like a great many other families of minute insects the Coccidæ have been comparatively little studied in America, but to the fruit grower, forester, florist and others, the scale insects are of very great economic importance. Most of the species found in Canada have been introduced from other countries, only a few species being native to Canada. It is the imported species that give most trouble to agriculturists. It almost invariably occurs that when the balance of nature is disturbed, as is the case of introducing new form of life into a new country hitherto free from that form, unusual increase in numbers immediately follows. The habits of the Coccids are interesting and varied, and they are one of the most cosmopolitan insects known. They are found in the north as far as the 60th degree and equally as far south. In the tropics they are most at home, but when exported abroad they readily adapt themselves to nearly all conditions of temperature and climate. In some instances the spread is gradual, as in the San José; spreading northward the covering of the scale must undergo a thickening to protect it from the severer weather. Sometimes the spread is limited by the lack of suitable host plants, but in many cases, such as New York Plum Scale (*Eulecanium cerasifex*) the insect readily adapts itself to almost any kind of plant food, scarcely a tree, shrub or vine being immune. The writer has found many different species of herbs under badly infested trees literally covered with this pest.

A study of the habits of the Coccidæ furnish some very interesting phenomena of animal life. In Australia some species produce galls of all shapes and sizes on the eucalyptus trees. In Africa a large species found underground (*Margarodes*) are collected by the natives to make necklaces, bracelets, and other ornaments. Another species (*Tachardia lacca*) forms a useful product known as lac. The cochineal insect is noted for its commercial value as a dye, and numerous other scales are important from a commercial standpoint.

Gall-Makers.

Perhaps there is no more interesting species than those belonging to the genus *Brachysceles,* which are found in the land of anomalies, Australia. Mr. Claud Fuller, has published a bulletin on Gall-making Coccids in which he describes the galls as follows:—

"*Galls of the Male Coccid.*—These are invariably short cylindrical tubes, two to six inches in length, generally growing upon the leaves; they are mostly of a purple claret colour, but often brown or green. Some are simple tubes with a notched rim at the summit, others have the rim dilated forming a saucer-like top. The male

gall of *B. rugosa,* Froggatt, is emerald green, cylindrical, constricted at the base, stout with thick, soft walls, the apex truncate; length, four lines; breadth one line. In several species these male galls grow upon the female gall; *B. munita,* Shrader, has the males separate and springing from the horns; in *B. phratrata,* Shr., *B. thorntoni,* Frogg., and *B. nux,* they are congregated together in a cup-like growth. This growth expands like a flower, and is, I am afraid, rather inaptly described by Shrader as a cockscomb, and as a mushroom-like growth by Froggatt. There is generally only one cup-growth attached to a female gall, but *B. nux,* as a rule, has two and often three. They are attached at one side of the summit of the female gall, which they often exceed several times in size.

The Female Galls exhibit a great variety of forms, which are the easiest means of distinguishing the different species, varying in size from one-half to six or seven inches in length. In the shape there is as great a variety as in the size; many of them resemble cone-like fruits, others nuts and fruits, whilst the lateral growths of *B. duplex* are not unlike leaves. Occasionally growing on stalks, they more often sit close upon either the twigs, branches, or leaves, from which they spring.

The Formation of Galls.—The number of various gall-making insects which have the remarkable power of diverting the forces of nature, as represented in the growth of a plant, to their own advantage, has given rise to a deal of speculation and experiment to discover the inherent element of property possessed by the insect by means of which it operates. Up to the present we can go no further than to say that the galls are due to an irritation set up by the insect, yet each individual species must have some peculiar properties or how would we find such widely differing results when in their initial stages the producers are as alike as the two proverbial peas? Mr. Tepper asserts that the larvæ always select an embryo-bud, and by the context he evidently wishes an undeveloped but true bud to be understood. This is, however, not the case; it may hold good in some instances, but certainly not in all. Whether upon stem or leaves the gall-growth originates from the cambium ring; the developmental activity of the cells is released by the insect, and a shoot forms over the growth of which the animal maintains direction. This is proved by the cessation of growth when the coccus, in a young stage, is killed by parasites.

The rudimentary gall, according to Dr. Alder, draws its nourishment from the surrounding tissue; later on, however, processes are driven into the gall from the spiral vessels of the cambium ring, which form a new element to assist in its development, and it thus becomes an independent structure, having individual powers which regulate its shape, position, etc. These remarks, whilst referring to galls formed by wasps, apply equally to coccid galls."

Secretions.

One of the main characteristics of the Coccidæ is their habits of secretion. Like the Aphids the insects secrete a sweetish substance known as honeydew, which is the sole food of several species of fungi and the chief food of many species of Ants. This fluid is excreted entirely by the females by a special organ, a cylindrical tube exserted from the genital orifice after the manner of the telescope. Honeydew is attractive to many other nectar feeding insects besides the ants, such as the Hive Bee and Bumble Bee and many species of Wasps.

A species known as *Physokermes abietis* found at Guelph, gives off a wax-like secretion which is collected and used by the Hive Bees in constructing their cells. This species is very abundant on Norway Spruce, and although causing considerable harm in the tree is very beneficial to the bee in supplying material for the foundation of its cells.

Another species, *Ericerus pela,* secretes a pure white wax, which in China is collected and made into candles for special use. In India similar use is also made of a wax obtained from a species of *Ceroplastes ceriferus.*

In India a species known as the Lac insect (*Tachardia lacca*) furnishes us with the useful product known as lac, which forms a basis for varnish, French polish and other important products. It is collected in its native home, India or Ceylon, and sent abroad on the twigs and branches upon which the insect has worked and deposited the substance. This raw material is then subjected to a process of refining by which the material is gathered in the form of shell-lac and is then ready for use. It may be interesting here to offer a brief life history of the insect itself which produces this very valuable material. Mr. Robert Newstead, quoting from the Royal Horticultural Journal in his work on the Coccidæ of the British Isles, writes as follows on the species:—

"Like all other Coccids, the young (larvæ) are active; they are at first very tiny creatures, resembling mites, and are generally spoken of by the horticulturist as 'lice.' These young arrange themselves in groups of various dimensions round the twigs of the food-plant, and, having settled matters satisfactorily as to space, insert their thread-like sucking-tube (mouth), into the plant tissues, and pump up the sap of the tree. At the same time they commence covering their bodies with the peculiar 'lac' which, by the time they are fully developed adult females, assumes the form and size shown in the illustration. By taking a hot knife a transverse section of the material may easily be made, when it will be seen that the covering material or 'lac' is not a solid mass, but is honeycombed by large, somewhat ellipsoidal cells, each of which was once tenanted by a single female . . . If we examine a female we find she is shaped somewhat like the cavity in which she lives, with the cephalic portion bearing the mouth parts touching the bark at the narrow end of the cavity, and the abdominal extremity at the opposite end, having connection with the exterior by means of a minute perforation; and she is destitute of legs antennæ, etc. Where she has lived she dies, leaving as a legacy the wonderful product which she manufactured during life, and which all the world over is of so great importance in commerce. And this is not all; the bodies of the females also furnish an excellent dye, which in former times was of much value also."

Dissemination.

The female scale is wingless, hence they must be borne from place to place by agencies outside themselves, such as wind, water, plants and animals. It is very noticeable that with such scales as the San José the spread is always greatest in the direction of the prevailing winds. This, however, is possible only when the insects are in the active moving stage; as soon as they come to rest and attach themselves to their host no further spread occurs in this way. Rain too is supposed to help spread the scale when they are in the egg or young active stage, by washing them from the upper to the lower parts of the trees, but it is animals that effect the greatest dissemination from tree to tree. Birds frequenting orchards and forest trees undoubtedly carry numbers of scale insects attached to their feet and beak. A very wide distribution may occur in this way, even across bodies of water or mountain ranges. The insects and Acarids also assist in the local distribution of the scales. Lady Bird beetles and Ants among the insects and the predaceous species of mites are responsible for a great deal of the spread of the injurious scales. Another probable factor in distributing scale insects is the careless handling of the infected fruits, such as apples and pears. Refuse fruit is often allowed to come

in contact with unaffected trees and thus cause the free plants to become infested. The spread from one province or country to another is due almost entirely to the interchange of plants by nurserymen and florists. There is always the possibility of introducing scale wherever a shipment of shrubs or trees is made from one place to another. If the trees can adapt themselves to the new environment and become thrifty under the new condition, there is hardly any question about the scale surviving. In nearly all cases the scale undergoes the change without any apparent inconvenience.

Nature of the Injuries.

As nearly all scales derive their nourishment from the juices of the plant it is evident that a considerable weakening in its vitality must result. When only a few insects are present as we found on trees attacked by our native species, there seems to be very little injury to the tree, but when swarms of these occur in the case of the imported species the health of the tree is so impaired that in some cases death occurs. In cases where the trees do not actually die, but are rendered weak, a corresponding weakening is shown in the quality and quantity of the fruit. Some of the characteristics of the injury are seen in discolorations of the leaves and tissues, malformed and discolored fruit, and to some extent early maturing and falling of the leaves.

Life-History.

Most of the Homoptera have incomplete metamorphosis, but in the Coccidae only the females have incomplete metamorphosis; the males pass through the four stages. The eggs are seldom laid in exposed situations as is the case in their allies, the Aphids and Aleyrodids, but various means are provided for their protection from predaceous animals and from the weather. The Cottony Maple Scale lay their eggs in sacks formed of a cottony-like substance, which surrounds them. Others, such as *Physokermes abietis,* are deposited in a very peculiar pouch-like organ formed by the folding in of the outer epidermis. In Orthezia the female carries the eggs between the long waxen plates at the posterior extremity of the body. The most common color of the egg is yellow or pink, but a few are crimson, such as that of *Chionaspis salicis* and in some species of *Paralatoria* they are dark mauve. The number of eggs laid by an individual varies from 25 to two or three hundred.

The larvae, upon hatching, in the majority of species, remain for a few days within the covering provided for them. Soon they leave this house and become quite active, seeking the new and tender tissues, where in most cases they settle down and immediately insert their long sucking apparatus into the tissues, and in the case of the female, remain stationary until death.

The pupal stage occurs only in the males. After a few days of active larval life they withdraw their tubes and undergo marked changes characteristic only of the Coccidae.

Most of the adult males being destitute of mouth parts live only a few hours, or at most a few days.

The female adult is characterized by the absence of wings and by its well developed mouth parts. They are usually flat and pyriform in shape and covered with scales made from the secretions of their bodies. There are sometimes one and sometimes several generations in a season.

Characteristics and Classification.

The Coccids belong to the order Hemiptera and to the suborder Homoptera, which includes the Aleyrodidae, Psyllidæ Jassidæ, Membracidæ, Aphididæ and Cicadidæ. These females bear a striking resemblance to each other, which is especially noticeable in the immature stages of development. The larvæ of the Aleyrodidæ are often mistaken for the female adult scale insect. Among the Aphididæ, *Ceratophis lintaniæ* is frequently mistaken for a Coccid and is known by horticulturists as the "black seed scale." All the insects of this order have sucking mouth parts, and with few exceptions, incomplete metamorphosis. In the larval stages the male and female bear a close resemblance to each other, but in the adult stages they are readily recognized. In the female the wings are always absent; the metamorphosis is incomplete, with a mouth or rostrum placed on the ventral surface. In the male the metamorphosis is complete, the mouth is obsolete, usually a pair of wings, the posterior pair represented by a pair of halteres.

Orthezinæ.

90. *Orthezia americana* (Walk.). This scale has been found at Grimsby, Ontario, on Golden Rod; at Woodstock, Ontario, on Ragweed. It has also been recorded by Dr. Fletcher at Ottawa, and several places in Quebec.

98. *Orthezia insignis* (Dougl.). This species was first found at the Fruit, Flower and Honey Show, Toronto, in 1906. It was next seen in the conservatories at Guelph in 1907, and since that time the writer has collected it in many parts of Ontario.

103. *Orthezia occidentalis* (Dougl.). This interesting and beautiful species was found by J. Wm. Cockle, Kaslo, B. C., on roots of grass and trees amongst rotten wood. He remarks that he has found them in great numbers on several occasions on the roots of apple trees, which had grown wild amongst a pile of chips. The specimens were identified by Prof. J. G. Sanders of Washington.

Dactylopiinæ.

192. *Asterolecanium variolosum* (Ratz). This species was found by Dr. Fletcher in 1900, on young oak trees at Ottawa, Canada, which were set out in 1895, and came from a nursery in Pennsylvania. It has been found destructive to oaks at Niagara Falls, Ontario.

242. *Kermes galliformis* (Riley). These scales occur either singly or in clusters on the twigs and branches of Red Oak (*Quercus rubra*). It is beautifully variegated with yellowish, gray and black, and nearly always accompanied by a Lepidopterous parasite. It is found all through the Niagara District, in the city of Toronto, and to some extent in the south-western corner of the Province.

254. *Kermes pettiti* (Ehrh). This species was first found at Jubilee Point on Rice Lake, near Peterborough, Ontario, by Dr. Fletcher, in 1899. The writer has found this species at Guelph, Toronto, Ottawa, and other places in Ontario. It is very common and has a wide range in Ontario.

255. *Kermes pubescens* (Bogue). The writer has found this species on oak at Guelph, Toronto and Perth, Ontario, and is probably wide spread over the Province. It was found abundant on each infested tree and undoubtedly does considerable injury. It is usually found in the cracks of the bark on the trunk and branches.

279. *Gossyparia spuria* (Modeu). This species was found attacking a few Elm trees in the city of Toronto in 1906, and since that time it has spread to nearly all parts of Toronto and has proven to be a very destructive pest.

293. *Eriococcus borealis* (Ckll.). This is a native species found on Willow (*Salix*) at Dawson City, 64 degrees North Lat., by Mr. John Morley, in 1899. As far as I am aware this species has not been found in any other locality.

391. *Phenacoccus aceris* (Sign.). It has been received from Amherstburg and St. Catharines, Ontario. So far it has confined its attacks to the Soft Maple (*Acer saccharinum*). *Several* trees were badly attacked by this scale and the writer ordered the destruction of the infested trees.

401. *Phenacoccus dearnessi* (King). This species was found by John Dearness on Hawthorne (*Crataegus sp.*) at London, Ontario.

454. *Pseudococcus citri* (Risso). It is found in conservatories on many species of plant throughout Canada. Closely related species or varieties are found on the Apple and other Rosaceous plants in the open, at Guelph and Toronto, Ontario.

490. *Pseudococcus longispinus* (Targ.). Very abundant on many species of indoor plants in all parts of the Dominion.

529. *Pseudococcus trifolii* (Forbes). The writer found this species very abundant on the roots of cultivated clover at Collingwood, Ontario.

572. *Ripersia lasii* (Ckll.). This species was found in Ants' nest (*Lasius americanus*) at Toronto, Canada, in 1897, by Mr. R. J. Crew. The writer has found this species in Ants' nest at Guelph, Ontario.

Coccinæ.

661. *Pulvinaria floccifera* (Westw.). This species was found in a greenhouse at Ottawa, Canada, December 15, 1894, on leaves of *Brassia verrucosa.* King described this as a separate species, *P. brassiae.*

675. *Pulvinaria occidentalis* (Ckll.). This species was found infesting in a serious manner a whole plantation of Red and White Currant at Chilliwack, British Columbia, by Rev. G. W. Taylor, in the spring of 1899. In July (the same year) Dr. Fletcher visited the plantation and found these scales to be in enormous numbers, the white flocculent threads giving the bushes the same appearance as if a light fall of snow were upon them. It has also been found by Dr. Mackay, June 14, 1901, on Gooseberry bushes at Dartmouth, Nova Scotia.

699. *Pulvinaria vitis* (Linn.).—*P. innumerabilis* (Rathvon)—*P. tiliæ* (King and Ckll.)—*P. viburni* (King). This species is commonly known as the Cottony Maple Scale and is found all over the Western part of the Province at least, and also in the woods at Aylmer in the Province of Quebec, nine miles from Ottawa. As the name indicates it attacks the Maple chiefly, and in cities often does much damage to maple shade trees. It is, however, rarely abundant for many seasons in succession, because of the attacks of parasites. Although the maple trees are the ones most commonly attacked, the scale is found on many other trees and shrubs as well. It has been found at Guelph on *Acer saccharum, A. saccharinum, A. nigrum, A. rubrum.* and *A. negundo, Tilia americana, Ulmus americana, Crataegus sp., Populus alba, Salix sp., Cornus stolonifera, Ilex verticillata, Spiræa salicifolia,* and *Vitis cordifolia.*

724. *Eriopeltis festucæ* (Fonse). The Cottony Grass Scale was found by Mr. A. H. Mackay, on grass in large numbers in Cumberland Co., Nova Scotia, in 1889. It has occurred in conspicuous numbers several times in Nova Scotia and

New Brunswick. This species has been recorded at Ottawa, Ontario, but Dr. Fletcher says, it was a mistake and, if so, we have no record of this species in Ontario.

848. *Coccus hesperidum* (Linn.). Commonly known as the Soft Scale, is found abundantly in conservatories in Oleander, Orange, Lemon, etc., in all the provinces of the Dominion.

860. *Coccus pseudohesperidum* (Ckll.). This is a very large species found on Orchids in the conservatories at Guelph and Ottawa. It is usually most abundant on *Cattleya sp.* These are the only records for this species. Its nativity is unknown.

902. *Toumeyella pini* (King). This species was found by Mr. J. Dearness on Austrian Pine (Pinus austriaca), at London, Ontario.

902b. *Toumeyella liriodendri* (Gmel.). This species was first reported by Dr. Fletcher on Tulip at Ottawa, Ontario.

911. *Eulecanium persicæ* (Craw).—Fab. 1.—*E. armeniacum*). In Mr. King's account of the scales of British North America he reports this species infesting orchards at Sherbrooke, Quebec, in 1899. This species has also been reported from Prince Edward Island.

918. *Eulecanium caryæ* (Fitch). This species is said to be the largest known species of Eulecanium. It has been in Ontario for at least 12 years, having been first found by Dr. Fletcher in the Niagara district in 1898. Judging from the fact that it has been found in that district on Peach trees and that we have found it plentiful on forest trees at Guelph, it probably occurs at least all over the south-western part of Ontario. The scale is seldom sufficiently injurious enough to cause any alarm. It has been found on *Crataegus sp.; Ulmus americana; Ulmus racemosa; Ostrya virginica; Carpinus caroliniana* at Guelph, Ontario, and on the Peach (*Prunus persica*) at St. Catharines, Ontario. It has also been reported from Nova Scotia on forest trees. It is usually accompanied with parasites in Ontario.

921. *Eulecanium cerasifex* (Fitch).—*E. canadense* (Ckll.); *E. caryarum* (Ckll.); *N. corylifex* (Fitch); *E. cynosbati* (Fitch); *E. fraxini*, (King); *E. guignardi* (King); *E. juglandis* (Bouche); *E. maclurarum* (Ckll.); *E. websteri* (Ckll. and King); *E. fitchii* (Lign); *C. pruinosum* (Cqul.). The New York Plum Scale has become the most common scale in Ontario and Quebec. The writer has found this scale on a great range of trees, shrubs, vines and herbs, the following being a list of those so far recorded: *Acer nigra, Acer saccharum, Acer saccharinum, Acer spicatum, Acer negundo,* and many varieties of the above mentioned species, *Aesculus hippocastanum. Staphylea trifolia, Rhamnis cathartica, Psedera quinquefolia, Vitis cordifolia, Tilia americana, Tilia europea, Carya ovata, Carya glabra, Corylus americana, Ostrya virginiana, Carpinus caroliniana, Betula lenta, Betula lutea, Alnus incana, Fagus grandifolia, Castanea dentata, Quercus robur, Quercus macrocarpa, Quercus rubra, Quercus coccinea, Ulmus americana, Ulmus campestris, Ulmus fulva, Ulmus racemosa, Celtis occidentalis, Juglans nigra, Juglans cinerea, Salix sp., Populus alba, Populus tremuloides, P. balsamifera, Populus deltoides, Crataegus sp., Rubus occidentalis, Rubus strigosus, Prunus serotina, Prunus virginiana, Prunus nigra, Prunus persica, Pyrus malus, Pyrus japonica, Pyrus communis, Amelanchier canadensis, Sambucus canadensis, Sambucus racemosa, Ribes nigrum, Ribes vulgare, Hamamelis virginiana, Ribes cynosbati, Cornus stolonifera, zanthoxylum americanum.* In addition to these many species of herbs near infested trees. It is spread over practically the whole of Ontario and the eastern provinces. Though not so destructive as the Oyster Shell Scale, it is often quite injurious where abundant and sometimes kills the infested tree.

935. *Eulecanium fletcheri* (Ckll.).—*E. pallidor* (Ckll. and King). In 1907, the writer found this species on White Cedar at Guelph. It was originally described from specimens found by Dr. Fletcher abundant on a hedge of *Arbor vitæ* and on trees of the same species at Stittsville, Ontario, fifteen miles from Ottawa. This species is nearly always parasitized by a Chalcid. In 1908, *E. fletcheri* was found on the Red Cedar (*Juniperus virginiana*) at Guelph and Hamilton, Ontario.

946. *Eulecanium lymani* (King). Recorded by Mr. King on a young Oak at Quebec city and North Hatley, Quebec. This may be the same as *E. cerasifex.*

950. *Eulecanium nigrofasciatum* (Perg.). This strikingly marked species has been received from Walkerville on Soft Maple and on Peach at St. Catharines, Ontario. In both cases the trees were badly infested and no parasites were found. As far as I am aware it has not spread to any other parts of the Province.

958. *Eulecanium pyri* (Schr.). King records this species on Apple trees in Prince Edward Island.

959. *Eulecanium quercifex* (Fitch).—*E. quercitronis* (Fitch); *E. antennatum var.* (Ckll.). This species occurs on Oak (*Quercus coccinea*) at Ottawa, Ontario and on Oak (*Quercus rubra*) from Jubilee Point, Rice Lake, Ontario.

965. *Eulecanium rosæ* (King). Recorded by Mr. King in his account of the Scales of British North America. I have not found *E. cerasifex* on any cultivated or wild species of rose. The species was found in Rosebush at Sherbrooke, Quebec.

974. *Eulecanium vini* (Bouche). This species has been found by the writer on Grape vines in the Niagara district and to some extent on Grape vines in the City of Toronto. Mr. King received specimens from Dr. Fletcher at Ottawa, on *Spiraea salicifolia.* These scales have in all probability been imported on nursery stock from Germany.

993. *Saissetia hemisphæricum* (Targ.). It is a very common scale in conservatories in all the Provinces. Its favorite hosts are Oleander, Cocos, Sago Palm, Croton and Orchids.

1008. *Physokermes piceæ* (Schr.). The Spruce Physokermes was found attacking the Norway Spruce on the College grounds at Guelph. The domesticated bees collected wax from this species. This species has been reported from one or two other parts of Ontario.

DIASPINÆ.

1036. *Chionaspis americana* (Johnson). This species was found on American Elm (*Ulmus americana*) at Guelph.

1055. *Chionaspis furfura* (Fitch). The Scurfy Scale, though widely distributed through Ontario and the Eastern Provinces, is seldom found in so great abundance as the Oyster Shell. Badly infested trees or other plants are very much weakened and not infrequently killed as a result. Many kinds of trees and shrubs are attacked by this scale, but the most common are the Apple, Mountain Ash, Japan Quince, Horse Chestnut, Hawthorn, White Ash, Currant and Gooseberry.

1062. *Chionaspis lintneri* (Comstock) is found at Guelph on Alder (*Alnus incana*) ,Dogwood (*Cornus stolonifera*). It has been received from Ottawa and Rondeau in Ontario.

1073. *Chionaspis pinifoliæ* (Fitch). The Pine-leaf scale is very common in many parts of the Dominion. It has not, however, so far as we know, caused any perceptible injury to the trees, although reports from New York State go to show that whenever it is abundant on a tree it does much damage. This scale confines its attacks solely to Conifers. The writer has found it at Guelph on the following Pines: White, Bull, Austrian, Scotch, Jack and Dwarf Mugho, and also on the Norway and White Spruce.

1081. *Chionaspis salicis* (Linn.).—*C. Salisnigrae.* This species is found on Leatherwood (*Dercа palustris*). White Ash (*Fraxinus americana*) at Guelph, Ontario.

1096. *Aulacaspis boisduvalii* (Sign). This species has been found in the conservatories at Guelph and Ottawa. At Guelph the writer found it very abundant on several species of Palms, and at Ottawa Dr. Fletcher found it on the Orchid belonging to the genus *Cattleya.*

1127. *Aulacaspis rosæ* (Bouche). Here and there all over the Dominion we find this rose scale attacking rose bushes and Blackberry and Raspberry canes. The plants attacked are nearly always in damp, shady places, such as overcrowded gardens. Dr. Fletcher has found it common in British Columbia and Nova Scotia.

1143. *Hemichionaspis aspidistræ* (Sign). It is found in conservatories at Ottawa on *Pteris serrulata.*

1198. *Aspidiotus abietis* (Schr.). The Balsam Aspidiotus has a wide range in Western Ontario. It is found on Hemlock (*Tsuga occidentalis*) and Balsam (*Abies balsamea*). In the woods at Guelph this species is very abundant.

Aspidiotus hybridum? This peculiar scale is found very abundantly on Willow and Balm of Gilead at Collingwood, Ontario. This species very closely agrees with *Aspidiotus juglans-regiæ and Aspidiotus ostræformis,* although it is not exactly like either one of them, and Prof. Marlatt, believes that it is a hybrid or cross between these two species. Judging from the infestations, I believe that this species has several generations in a season. It is a very destructive pest and nearly every tree around the fair grounds at Collingwood was attacked and many limbs and trees were dead.

1199. *Aspidiotus æsculi* (Johnson). This species is very common in Western Ontario. It has been found at Guelph, Brantford and Toronto on Basswood (*Tilia americana*) and Horse Chestnut (*Æsculus hippocastanum*).

1200. *Aspidiotus ancylus* (Putn.). The Putnam Scale is distributed fairly widely throughout Ontario, Quebec and Nova Scotia. It has not, however, been known to do much damage, although in some of the States across the boundary it is said to have been quite destructive. It is recorded from Ottawa on Elm; from Toronto on Willow; and St. Catharines on Plum; from Guelph on Cherry and Apple; from East Essex Co. on Plum and Shell-bark Hickory. .

1220. *Aspidiotus diffinis* (Newst). This was found in the woods on Basswood (*Tilia americana*) at several places in Western Ontario. Mr. King thinks that this species may prove to be a variety of *A. diffinis.*

1229. *Aspidiotus forbesi* (Johnson). The Cherry Scale, although found in several localities in Ontario, has not yet, with one or two exceptions, been reported as doing much damage. It has been found in Ontario, at Ottawa, London, St. Catharines, Grimsby and Prince Edward County. It is also recorded for Nova Scotia and Quebec. The host plants so far discovered are Cherry, Apple, Hawthorn, Fragrant Currant and Beech.

1233. *Aspidiotis hederæ* (Vall.). This species has been reported from nearly all the Provinces of the Dominion. It is confined to conservatories and house plants. It is a common species on Palms, Ivy, etc.

1239. *Aspidiotus juglans-regiæ* (Comst.). The English Walnut Scale has been found in Ontario in only two or three localities, although it probably exists in several other parts and also in the other provinces. The host plants so far discovered in Ontario are Apple, Willow and Poplar.

1250. *Aspidiotus osborni* (Newell and Ckll.). Osborn's Scale is found on forest trees in northern and western Ontario. It has been found on Paper Birch

(*Betula papyrifera*), Yellow Birch (*Betula lutea*), Cottonwood (*Populus deltoides*), White Oak (*Quercus alba*), White Pine (*Pinus strobus*). It is undoubtedly a very destructive scale.

1252. *Aspidiotus ostræformis* (Curt.). The Curtis Scale is much more widely distributed throughout Ontario than has been hitherto supposed but, in spite of its prevalence, it does not seem to be very destructive. It has been found at Collingwood in Western Ontario and as far east as Trenton in Eastern Ontario. It has also been reported from Chilliwack, British Columbia, and from several places in Prince Edward Island.

1256. *Aspidiotus perniciosus* (Comst.). Wherever it occurs the San José Scale is considered, and rightly so, the most destructive insect in the Dominion that fruit-growers have to combat. Almost every kind of fruit trees and bush fruits are liable to be attacked by the scale. Many shade trees are also attacked. It has become established in the following counties: Peel, Halton, Wentworth, Welland, Lincoln, Haldimand, Norfolk, Elgin, Kent and Essex.

1270. *Aspidiotus ulmi* (Johnson). The Elm Aspidiotus has been found by the writer in several localities in Western Ontario. It is most abundant at Guelph on the Soft Elm (*Ulmus americana*).

1294. *Chrysomphalus aonidum* (Linn.). This Coccid occurs in conservatories on *Ficus elastica*, at Guelph, Ontario.

1295. *Chrysomphalus aurantii* (Mask.). This species has been found on fruit imported from California.

1300. *Chrysomphalus dictyospermi* (Morg.). This Coccid has been found on Cinnamon in a conservatory at Ottawa.

1305. *Chrysomphalus obscurus* (Comst.). This species has been found in Ontario, but my notes on habitat and host plant have been lost.

1330. *Targionia dearnessi* (Ckll.). This interesting species was found by Mr. John Dearness, on Bearberry (*Arcostaphylos uva-ursi*) in the Bruce Peninsula Ontario.

1377. *Lepidosaphes beckii* (Newm.). This species only occurs on imported fruit, oranges, etc., from the South.

1431. *Lepidosaphes ulmi* (Linn.). The Oyster-shell Scale is generally distributed over Ontario, Quebec, British Columbia, Nova Scotia, and Prince Edward Island. It is one of the most injurious scales found in Canada. It is found on a host of plants, some of which are Apple, Pear, Plum, Cherry, Mountain Ash, Hawthorn, Red-osier Dogwood, Black and White Ash, Aspen, Prickly Ash, Mulberry and Horse Chestnut.

1422. *Inchinaspis longirostris* (Sign.). A palm (*Kentia sp.*) was badly infested at the Fruit, Flower and Honey Show, Toronto, 1908.

1442. *Parlatoria pergandei, var. theæ* (Comst.). This species was found on Lemon plants in the Ontario Agricultural College greenhouse at Guelph.

Undetermined Species of Pseudococcus. Specimens have been found on a host of plants, roots, stems, and leaves, but the species have not yet been determined.

Enemies of the Coccidæ.

There are upwards of seventy species of Scale Insects found in the Dominion of Canada at the present time, and these are held in check very largely by other forms of predaceous or parasitic plants or animals which by feeding upon them prevent them from increasing to such an extent as to be uncontrollable. As transportation has developed and commerce and international trade have taken place

between different countries, we have introduced not only many useful plants, but the insects which prey upon them. Often in the case of scale insects we have imported the scale and left behind some of the enemies which attack it. This gives the scale a tremendous advantage and often before the balance is restored very great damage is done. To restore the balance more speedily the entomologist looks to the native home of the scale to ascertain its most effective enemies. These are then imported and bred and liberated in various parts of the infested areas. In some cases, such as the Lady Bird Beetle, belonging to the genus Pentilla, has rendered excellent service to the fruitgrower. The chief enemies in Canada are birds, Acarids, insects and fungus parasites. The most effective of these are the Acarids and insects.

It is difficult to calculate accurately the amount of good service rendered by many of the insectivorous birds. Warblers and Vireos, on account of their aesthetic value and also the fact that they are insectivorous are rarely taken and subjected to examinations of stomach contents. Furthermore their minute size render it almost impossible to observe their actual work. The larger birds, such as the Hairy and Downy Woodpecker, have been secured, stomach contents examined and found to contain, in some cases, hundreds of scales in a single stomach. This is especially noticeable in the case of the very destructive New York Plum Scale. It is highly probable that these insectivorous birds rank first in the control of the larger kinds of scale insects, such as Eulecanium, Coccus and Kermes.

The mites again deserve a great deal of credit for their very efficient service to the fruit grower, in that they consume large numbers of scale insects all through the season. Some confine their attacks to one particular species, while others are general feeders, attacking a large variety of insect life. There are about eight known species of Acarids in Canada that are in some way associated with injurious forms of scale insects. There are at least, three species working upon the San José Scale: *Hemisarcoptes malus* is commonly found in the St. Catharines district. Species of *Monieziella* and *Rhyncholophus* were found feeding upon San José at Grimsby, Ontario. Four species were found either feeding upon the eggs or the adult of New York Plum Eulecanium. Three of these species belong to the genus *Rhyncholophus,* and the other to the genus *Gamasus.* All four undoubtedly help to keep this scale in check. Two species are found attacking the eggs of the Oyster-shell Scale. *Tyroglyphis longior* is very common at Guelph, and *Hemisarcoptes malus* at St. Catharines, Ontario. Another species belonging to the genus *Galumna* was found feeding upon the scale known as *Eulecanium fletcheri.*

Insect Enemies.

These, if not the most destructive are at least the most numerous of all Coccid enemies. They represent four orders of insects: the Hymenoptera, Coleoptera, Lepidoptera and Diptera. Mr. Alfred Eastham investigated the parasites of scale insects in Ontario and found twenty-three species belonging to the Hymenoptera.

Host Relations of Species of Aphelinæ Reared During the Summer in the Vicinity of Guelph.

Parasite.	*Host.*
Aphelinus mytilaspidis	Lepidosaphes ulmi.
	Chionaspis pinifoliæ
	Chionaspis salicis
	Aspidiotus perniciosus.
	Aspidiotus ostreæformis.

Parasite.	*Host.*
Aphelinus diaspidis	Aulacaspis rosæ.
Aphelinus fuscipennis	Aspidiotus perniciosus.
Coccophagus lecanii	Pulvinaria innumerabilis.
	Eulecanium cerasifex.
	Eulecanium fletcheri.
Coccophagus cognatus	Eulecanium fletcheri.
	Coccus hesperidum.
	Eulecanium cerasifex.
Coccophagus flavoscutellum	Pulvinaria innumerabilis.
	Eulecanium cerasifex.
Coccophagus fletcheri	Eulecanium fletcheri.
Ablerus clisiocampæ	Chionaspis furfurus.
Physcus varicornis	Chionaspis pinifoliæ.

Host Relations of the Species of Encyrtinæ Reared During the Past Summer in the Vicinity of Guelph.

Parasite.	*Host.*
Comys fusca	Eulecanium cerasifex.
Comys bicolor	Eulecanium fletcheri.
Comys scutellata	Eulecanium caryæ.
Chiloneurus albicornis	Eulecanium fletcheri.
	Eulecanium cerasifex.
	Eulecanium caryæ.
Aphycus jarvisi	Eulecanium fletcheri.
Aphycus pulchellus	Kermes pubescens.
Aphycus pulvinariæ.	Eulecanium fletcheri.
	Eulecanium cerasifex.
Aphycus johnsoni	Eulecanium cerasifex.
Aphycus flaviceps	Eulecanium cerasifex.
Blastothrix longipennis	Eulecanium cerasifex.
	Eulecanium fletcheri.
	Kermes pubescens
Encyrtus cyanocephalus	Eulecanium caryæ.
	Eulecanium cerasifex.
Encyrtus flavus	Eulecanium fletcheri.
Encyrtus sp.	Eulecanium fletcheri.
Encyrtus sp.	Kermes pubescens.

In the Coleoptera the Coccinellids are most conspicuous in combatting the more injurious species of scale insects. A small species known as *Hyperaspis signatus* in the larval stage has been found feeding upon the Curtis Scale at Guelph, Toronto, Grimsby and St. Catharines. In Toronto the same species was found in large numbers feeding upon the Forbes scale on a Hawthorn tree. The larva has also been found at Guelph feeding upon *Aspidiotus æsculi* and the New York Plum Scale. They probably do their most effective work upon the Cottony Maple Scale as it is estimated that they devour about eighty per cent. of the total scales produced in a season. Other species of Coccinellidæ are also beneficial in destroying a number of different scales. Two of the most common species are *Chilocorus bivulnerus* and *Seymus punctatus.*

In the order Diptera only one species is found to be effectual. This is the one known as *Leucopsis belulila* which parasitizes the Grass Scale (*Eriopeltis festucæ*) in Nova Scotia. There are also two species of Lepidoptera which are parasitic upon scale insects. One species is found attacking *Kermes galliformis* and the other species has been taken on the Cottony Maple Scale (*Pulvinaria vitis*).

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ALEYRODIDÆ OF ONTARIO.

Prof. T. D. Jarvis, O.A.C., Guelph.

There are at the present time three species of Aleyrodidæ found in Ontario: Aleyrodicus asarumis (Shimer) on the Wild Ginger (*Asarum canadense*) and the White Baneberry (*Actea alba*); Aleyrodes forbesii (Ashmead) on Soft Maple (*Acer saccharinum*) and Red Maple (*Acer rubrum*); Aleyrodes vaporariorum (*Westwood*) on Salvia, Solanum, Coleus, Coreopsis, Cucurbita, Cuphæ, Fuchsia, Hibiscus, Lycopersicum, Monarda, Rosa, Rudbeckia, Helianthus, Tropæolum, Verbena, Zinna, Digitalis, Pelargonium, Phlox, Cobea, Dahlia, Ribes, Fragaria, Solidago, Aster, Smilax, Polemonium, Delphinium, Achillea, Calliopsis, Chrysanthemum, Callistemma, Campanula, Antirrhinum, Berberis, Aquilegia, Lonicera, Nicotiana, etc.

Those who have made a special study of this group believe that the White Fly had its origin in some part of South America, the Neotropical region, where they formed the genus Aleurodicus, which except through human agency have remained there ever since. A branch belonging to the genus Aleyrodes has spread over the greater part of the world.

Aleyrodicus asarumis is a very common species in Ontario and was noticed in 1902 on a species of Wild Ginger at Guelph. *Aleyrodes forbesii* was first observed in the fall of 1907 up the River Speed from Guelph where the nymphs were found rather abundantly on the leaves of Soft Maple. *Aleyrodes vaporariorum,* which is most interesting and of greatest economic importance, is believed to be a native of Florida or Mexico; though it was first described and named by Westwood after it had reached England in 1856. Since reaching the United States it has spread gradually through the North-eastern part principally; and wherever introduced has multiplied very rapidly. Previous to 1900 there are only one or two reports of the species in Ontario. In 1903 it had appeared at the Ontario Agricultural College greenhouse and by 1906 had become fully established.

The White Fly or Mealy-wing Fly belongs to the Homopterous division of the order Hemiptera, in which the four similar membranous wings are held roof-like over the body. It is a member of the family Aleyrodidæ, which consists of small, active insects, easily recognizable by a characteristic, white, wax-like secretion, completely covering the wings and giving them the popular name Mealy-wings and White Fly. The young Mealy-winged Flies look much like scale insects and have the same general habits. The larvæ are flattened, oval, scale-like creatures found stationary on the lower sides of leaves. Most species of them bear numerous wax rods and copious secretions of wax all over their bodies. The pupa, also are characterized by their secretions of wax; and the amount and disposition of the rods and fringes on them are made use of very largely in the distinction of species in this family.

In their relationship with other insects the Aleyrodidæ come nearest the Aphididæ and the Coccidæ; from the former they differ most markedly in being stationery during their immature stages, and from the latter in being winged in both sexes of the adults and therefore capable of moving about rapidly.

The life-history of the White Fly (*Aleyrodes vaporariorum*) covers a period of approximately five weeks; and the broods succeed each other constantly, the year round. The eggs are oval, light green, changing to almost black in color, smooth and with a short stalk from one end raising it off the leaf. They are deposited irregularly on most kinds of leaves; but on smooth leaves it is quite characteristic for

many of them to be deposited in more or less nearly complete circles. The female has been observed by different persons to accomplish this arrangement of them by inserting her beak into the leaf and rotating around this as on a pivot. The eggs hatch in about ten days, and the young larvæ move about for a short time and then insert their mouth parts into the tissues of the leaf and assume their scale-like form. When fully grown, which is in about two weeks, the larvae are less than a millimetre in length. After about two weeks longer in the pupal stage the adults emerge. It is difficult to say how long they may live in the mature form.

It is only a small family consisting of two genera and about 150 species. Like many of the other families of insects of small size it has been much neglected.

The two species attacking the Maple and Wild Ginger have a wide distribution in Ontario, especially in the Western portion of the Province. *Aleyrodicus asarumis* have been found almost everywhere that the Wild Ginger grows. It is sometimes found on the White Baneberry at Guelph, but it seems to have a decided preference for the Wild Ginger. It confines its attacks to the lower side of the leaves and is usually so numerous as to almost cover this side of the leaf. Large quantities of honey dew are given off by this species and the honey dew fungus nearly always accompanies the insect. The life-history in Canada has not yet been fully determined, but sufficient is known to prove there are at least two broods during the season. It passes the winter in the mature form, but the writer has not yet been able to find the hibernating quarters. Shortly after the Wild Ginger leaves have expanded in the spring the White Fly may be found in the egg stage on the leaf. In the course of a few weeks the affected leaves turn yellow and myriads of the creatures may be seen at work. No insect parasites have been observed at work on this species and from this we may infer that it has been somewhat recently introduced.

Aleyrodes forbesii has been found as far east as Toronto, as far north as Gravenhurst, and as far south as London, Ontario, and the indications are that it is almost as widely distributed in Western Ontario as the maple itself. It is the largest of the three species under discussion. The adults are rarely seen and the large, box-like larvæ are sparingly scattered over the under surface of the leaf. The larvæ are pale green or whitish, somewhat the same color as their surroundings or environment and it is probably due to these two things that this species has not been reported more often. The work of insect parasites has been observed on several occasions in connection with this species and this probably accounts for the comparatively small amount of injury done to the host. The ravages are much less some seasons than others.

It is interesting to note that the above two species are both found in the State of Illinois.

Aleyrodes vaporariorum is of very great concern to people engaged in greenhouse work. From enquiry made to florists in all parts of Ontario it would appear that not a single section is free from the pest. As it cannot, so far as is known, winter in any stage out-of-doors, at least in its northern part of its range, it is recognized principally as a greenhouse pest, but it is sometimes very common and destructive to gardens and small fruits, especially in the vicinity where it is carried over the winter in greenhouses. It appears to be very partial to members of the family of plants known as the Solanaceæ, i.e., tomato, tobacco, etc. Several reports have been received from gardeners in different parts of the Province where crops had been ruined by this pest. It is sometimes very abundant on the strawberry and currant plants. In the fall when the temperature lowers they seek

shelter in green houses or homes where plants are kept and a constant reproduction is kept up the year round.

Another way in which these species do injury is due to the supply of honey dew given off where a fungus grows and spreads over the surface of the leaf, interfering with the nutrition of the plant.

The insect is not a good flyer, but can go considerable distances with the wind, and whole neighborhoods are often infected in this way. The flies are often carried from place to place on infested plants or parts of plants for identification purposes. They cling tenaciously to clothing and are sometimes carried from greenhouse to garden in this way.

So far very few parasites have been found at work on the Aleyrodidæ of this country and these have not yet been identified. In South America and other tropical countries many species have been found, notably the families Trichogrammatidæ, Aphelinidæ, Eupelinidæ, Mymaridæ, Platygastridæ, Diapridæ, Formicoidæ of the Hymenoptera, Chrysopa of the Neuroptera, Thrips, belonging to the Thysanoptera; Mites of the Acarina. In addition to the above-mentioned families of insects and acarids two genera of fungi, Aschersonia and Sphaerostilbe also assist in the control of the White Fly.

It is my experience that considering all kinds and conditions of plants and greenhouses cyanide of potassium, although perhaps used the least, is the cheapest and most effective means for fumigation. The best results are obtained by using ¾ of an ounce of potassium cyanide at a cost of 2½ cents, and 1½ ounces of sulphuric acid at a cost of about ¼ cent, per thousand cubic feet. This method, besides costing only about 2½ cents per thousand feet, is thoroughly effective and requires little labor in its application.

As this means has heretofore been considered by a great many florists as dangerous to human life in its application, it has been but sparsely used. The solution, however, is so weak that there is not the least danger to human life or health if only the simplest precautions are taken.

The formula recommended is as follows:

Potassium cyanide, 1 ounce by weight;
Sulphuric acid, 1½ ounces by volume;
Water, 3 ounces by volume.

The cyanide should in all cases be chemically pure, 98 per cent pure cyanide, and the sulphuric acid should be the best commercial, or 85 per cent. grade. It is always best to have the cyanide broken up into small pieces. Generators should always be earthen or glass vessels, never metal, having a gallon capacity. In order to distribute the gas equally throughout the greenhouse it is well to place the generators at equal distances apart along the walls. The greenhouse should be as much as possible airtight, with dry atmosphere and a temperature of below 60 degrees Fahrenheit, and the generation of gas should be done after darkness has set in. After having placed the generators properly, with water and sulphuric acid, the packages of cyanide are then added, commencing at the generator farthest from the place of exit, and the operators should then leave as soon as possible and close the door. The dropping of the packages of cyanide into the generators by means of a cord operated from a position outside of the greenhouse is entirely unnecessary and is now quite obsolete, as the fumes from the composition are too weak to do any injury. The quantity of the doses must, however, always be regulated by the florist from the condition of the greenhouse, the plants, and the insects to be destroyed.

It is the confidence I have in the remedy which prompts me to highly recommend it as the cheapest and most effective means for destroying the White Fly in

greenhouses, without, however, destroying or endangering the health or life of plants or of the operator of this remedy, and I would encourage in every way possible the use of this means that these insects, if not totally destroyed, are still so kept in check as to do but the minimum of harm.

SOME INSECTS OF THE LARCH.

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It is my intention to describe to you this afternoon rather briefly an attack made this summer upon a small clump of larch by a series of scolytid beetles; and to use this attack as an illustration of the breeding habits of Scolytidæ in our great forests of pine and spruce.

The larch bush to which I refer is situated at Hudson, about ten miles west of Ste. Anne's. The trees were fine specimens of Larix of medium size, with an average height of perhaps 40 feet, and until this season had been particularly healthy. Previous to this season I had not taken a scolytid from larch in that immediate neighborhood. Last winter a wide section was cut through the bush, and a plank walk laid through it, about three feet from the ground. The stumps were left rather high; the greater part of the rubbish was removed; several untrimmed larches were left lying in the clearing and one was lying well shaded by standing trees; and the trunks which had not been removed were piled in the clearing and left to dry through the summer.

The scolytids which attacked the dying bark, thus provided, belonged to five species: *Dendroctonus simplex, Dryocoetes autographus, Dryocoetes* n. sp., *Ips caelatus* and *Ips balsameus*. In the wood of the stumps an ambrosia beetle, *Gnathotrichus materiarius*, bred in large numbers.

I wish first to discuss the habits of these species very briefly.

D. simplex, Lec. This species is the common Dendroctonus of larch and is probably to be found wherever that tree is abundant. It is recorded from West Virginia northwards to Ungava and west to Michigan, and I have seen specimens in Mr. Evans' collection from Mackinak, Man. As the larch is found throughout all Eastern Canada excepting Northern Ungava and westwards to the Rockies, excepting the Barren Grounds, this beetle will probably be found throughout all that region. It is not a particularly injurious species. It prefers the bark of stumps and recently cut and dying trees, but will attack apparently healthy trees when dying bark is not to be obtained. It occurs chiefly in the bark of the trunk.

This species was first noticed this season on July 10th in the bark of larch stumps. The trees had been cut the preceding winter, and cleared away, leaving stumps about 1½ feet high. The place was swampy, and although the stumps were in the open sunlight, they remained sappy throughout the season. Only a part, perhaps half, the stumps of the clearing were attacked by this species. On July 10th—the date on which they were first noticed—the egg-tunnels contained eggs in the outer ends: and larvæ of all sizes, from those recently hatched up to nearly full-grown, were boring in the bark. There were no pupæ and no young adults.

About a month later (August 6th) the tunnels in these stumps contained full-grown larvæ, pupae, recently transformed, light coloured adults, and older, darker adults; and many adults had escaped, as evidenced by the holes through the bark above the ends of the larval tunnels. The larvæ were in tunnels coming from the

distal end of the egg-tunnel; the pupæ in the ends of larval tunnels arising nearer the entrance hole; the light-coloured adults in tunnels arising still nearer the entrance hole; and, lastly, the darker adults in tunnels coming from the proximal end of the egg-tunnel.

On the same day, August 6th, this species was found in large numbers starting tunnels in a felled larch which lay near the stumps just referred to, but shaded by standing trees. A few felled larches lay in the open clearing, but these were not attacked. Egg-tunnels of this second brood were also found in many of the stumps. A standing larch, evidently dying, contained many fresh tunnels of *Ips balsameus* but none of *D. simplex*.

The tunnels of *simplex* in the fallen larch were, on Aug. 6, usually well started, with numbers of eggs already laid, but no eggs had hatched. Very evi-

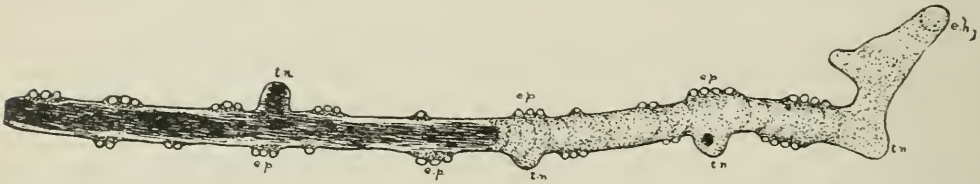

Fig. 4. *D. simplex*. Lec. An egg-tunnel showing egg-pocket, e.p., containing eggs; turning niches, t.n., and entrance-hole, e.h.

Fig. 5. *D. simplex*. Development of larval galleries; larvæ half-grown. e.t., egg-tunnels; l.g., larval galleries; larvæ were working in the clear spaces.

dently we had there a second brood, although I did not actually trace the newly transformed beetles from the stumps to the felled tree, and one brood a season has hitherto been recorded for this beetle.

The egg tunnels are about 1/8 inch wide, although the width is very irregular in the different parts of the tunnel. In an egg-tunnel recently started, the half nearest the entrance hole will be packed tightly with chips and excrement, and in the distal—empty—half will be found the beetles, a pair or more. In some I have found one female and as many as three males. As the tunnel is lengthened, the refuse, chips and excrement, is packed towards the entrance, leaving always a short, clear space at the distal end. As the tunnel increases in length, shallow pockets

are cut in the bark along the sides, and in these the eggs are deposited, on end, and packed in dust. Usually three eggs are found in a pocket, but sometimes 4, 2 or 1. The pockets are cut at the end of the tunnel on the side, so that the female must reverse her position to oviposit. The diameter of the tunnel will not admit of this, so along the sides of the tunnels are found wide niches, as wide as the tunnel, which may be called turning-niches. These seem to be used by the beetles in turning about and in passing each other in the tunnel. Very rarely an egg or two will be laid on their sides. The eggs of one pocket being laid, the female lengthens the tunnel and cuts another egg-pocket, and so on until all her eggs are deposited.

The chips resulting from the boring operations, together with the excrement of the beetles, are packed firmly backwards towards the entrance hole, and not uncommonly eggs are found packed in this mass. By the time the tunnel has neared completion, we find usually a female in a clear space at the tunnel's end, and behind her the dust packed firmly with one or two clear spaces at intervals, in each of which will be a male completely walled in and contentedly feeding on the chips or on the sides of the tunnel. Not infrequently there will be an egg-tunnel branching from the first, cut by a female which had entered the first tunnel before the entrance was blocked with chips. These side tunnels often open into neighboring egg-tunnels, so that adjoining tunnels appear to anastomose. Occasionally ventilation holes are cut in the bark forming the tunnel roof, but very few of these were noticed.

The larvæ which hatch from the eggs along the tunnel sides bore into the bark away from the egg-tunnel, cutting the larval galleries, which at first very tiny and entirely in the bark, gradually increase in diameter as the larvæ grow, and finally score the wood. The larval galleries are extremely irregular, crossing and recrossing each other until the bark of that part is almost entirely reduced to powder, which packs the galleries. The larvæ which hatch from eggs laid in the chips packing the egg tunnel feed upon the mass of chips for a time, and later enter the bark from the tunnel sides.

Egg-laying lasts over a considerable period. Eggs and newly hatched larvæ of the second brood were found as late as August 26th. This second brood matured in sticks in the laboratory early in October, and emerged through holes in the bark.

Polygraphus rufipennis. This common bark beetle of spruce and pine seems quite as ready to attack dying larch bark, for we found it this season in great numbers in the piled larch trunks and tops and the felled larches lying in the clearing. I have never found this species in healthy trees. It is very common in dying bark of spruce, and, in our section, in red and white pine. This is a small bark beetle, 3mm. long, of a uniform dark brown or nearly black colour. It is readily distinguished by the combination of divided eyes and undivided, distally pointed, pubescent antennal club. Its work is well illustrated in the collection exhibited. An entrance hole is cut through the bark and a shallow chamber, called the nuptial chamber is excavated therein. From this chamber are cut in a radiating fashion, and between the bark and wood, from three to five egg-tunnels. The females cut the tunnels and in the nuptial chamber will be found the only male busy ejecting through the entrance hole the boring dust which the females have brought to the tunnel entrances. The eggs are laid singly along the sides of the tunnels, each in a tiny pocket called an egg-niche, and firmly packed in dust; so that the sides of the tunnel are smooth and the eggs completely hidden. From a few to twenty eggs will be found on each tunnel side. The larvæ which hatch from the eggs bore into the bark directly away from the egg-tunnels. When the larvæ are not much crowded their tunnels are fairly regular, but when many egg-tunnels lie close

together, as is usually the case, the larval galleries cross and re-cross, completely riddling the bark eventually. The larvæ pupate in the ends of the galleries and emerge by cutting each a round hole through the overlying bark. Often, as with many bark beetles, the young adults feed for a short time on the bark before cutting through to escape.

We have two broods of this species. The tunnels of the over-wintered beetles were started the last of May this year in the larch. By July 10th in these tunnels could be found well-grown larvæ, pupæ and young adults; and light coloured, and therefore recently transformed adults, were busy starting tunnels in felled larches lying in the clearing. The adults continued to emerge for several weeks, and on August 6th egg-tunnels were being cut and eggs laid in the fallen larch before referred to in connection with *D. simplex*. So far as my observations go, the tunnel is started by a female, and a male, and other females, join her later. The egg-tunnels are usually kept clean in this species, although more or less boring-dust is at times found in them. They seem to start their tunnels, at times, from the sides of a *simplex* tunnel, where they are sometimes found exploring during the entrance season. This second brood will apparently mature completely this fall, and hibernate as adults.

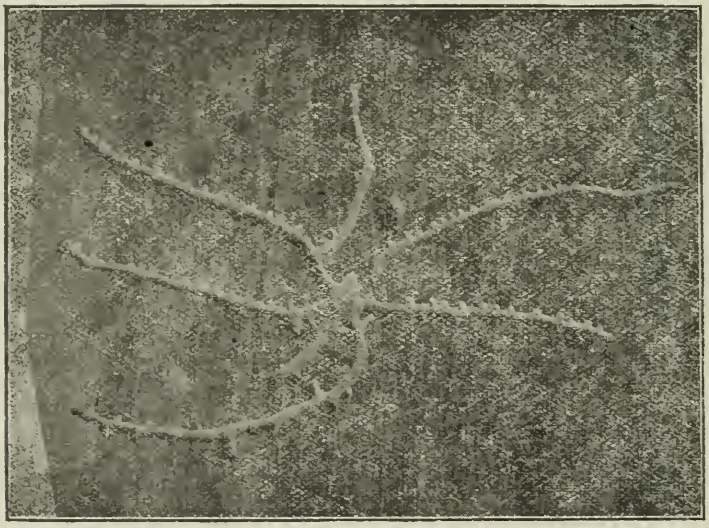

FIG. 6.
Work of *Ips balsameus* in Abies, showing nuptial chamber, egg-tunnels, and egg-niche. The eggs were removed before hatching.

Ips balsameus was found on the 10th of July, starting tunnels in a diseased larch in the same bush. I could not be sure that this species had been the primary cause of the injury, apparently not, but certainly *balsameus* was helping things along merrily. This species breeds chiefly in the fir, sometimes also in the pine; and it frequently attacks and destroys trees, which, while certainly unhealthy at the beginning of the *balsameus* attack, might otherwise survive. It is to be considered an injurious species in fir and larch. There are two broods each season with us; the first eggs were laid in pine this season in the middle of May, and the second was, in larch, as just stated, early in July.

Ips cælatus—a larger but closely allied species—was numerous in the larch stumps. Its entrance hole is deep, and the nuptial chamber is often entirely in the

thick bark. From the nuptial chamber come off the winding, irregular egg-tunnels. The eggs are laid in groups of two to eight, in deep pockets along the sides of the egg-tunnel. The borings of the larvæ are very irregular and penetrate the bark in all directions. The larvæ pupate in their tunnels in the bark, and appeared through their exit holes early in July to start tunnels for a new brood. Egg-laying for the second brood was well advanced in the bark of the stumps on July 10th of this season. This species is common in our district in red and white pine. It works in the bark towards the base of dying trees; particularly it is found in stumps cut the preceding winter. I have never noticed it in healthy trees, although it might injure them when no dying bark was available. The first brood was egg-laying in white pine at Ste. Anne's, the second week in May this year, and when first noticed in larch, May 24, the eggs were practically all laid.

Dryocoetes autographus was breeding in the bark of the larch stumps. Its egg-tunnels are irregular, anastomosing, and when numerous difficult to follow.

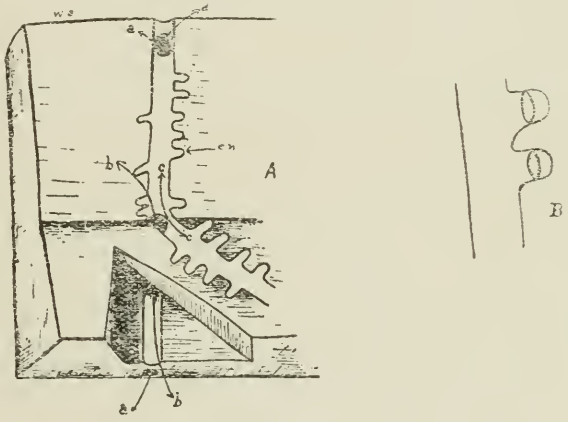

FIG. 7.
G. materiarius. Work in larch wood.A.—w.s., wood surface; e.n., egg-niche; d., a tunnel ending blindly behind a. In this tunnel the fungus develops rapidly. Eggs and larvæ have been removed from the niches. B.—Two eggs in position in the niches.

The eggs are laid side by side in shallow niches along the side of the egg-tunnel, and packed in dust. The longer axis points away from the centre of the tree. Frequently the eggs are sunken irregularly into the bark of the tunnel roof and packed in dust. The larval galleries are very irregular, usually destroying the bark. Both egg-tunnels and larval galleries are often entirely in the bark. There are two broods each season with us. By July 10th this season the egg-tunnels were about completed in the larch stumps, with the eggs practically all laid and many larvæ working into the bark. By the first of August these larvæ had matured in part and eggs were being laid in new tunnels from the sixth to the twentieth of that month. This insect prefers dying and dead bark of pine, spruce and larch, and works mostly at the base of the tree. It is not particularly injurious. A smaller, undescribed species of *Dryocoetes* was working with *autographus*, and has very similar habits.

This completes the list of the true Bark-beetles found in those larches. There was also present another scolytid—*Gnathotrichus materiarius*—one of the Ambrosia

beetles. This species bores well into the wood, cutting several side tunnels; each tunnel is cut, usually, by a separate female. The eggs are laid in shallow niches cut in the wood along the sides of the tunnels. The eggs are spindle-shaped and wedged into the niches, one in each, a little above the bottom, and a mass of chips and excrement, on which the ambrosia starts, is plugged into the opening. The larvæ deepen the niches until the depth is slightly greater than the length of the larvæ when full-grown. In these niches the larvæ pupate, and from them the adults push their way through the wall of dust and fungus which has previously blocked them in from the tunnel. The chief food of both adults and larvæ seems to be a fungus which grows on the walls of the tunnels and niches. The fungus is carried from tunnel to tunnel by the beetles, and stains the walls deep brown or black. The habits of the Ambrosia beetles are very interesting, but I shall not discuss them further at this time. There are two broods of this species in our district. The first brood was egg-laying this season on May 24th, and matured late in July. By the 6th of August new tunnels were being started in the stumps, and eggs laid for the second brood. Many eggs of the second brood were apparently destroyed by minute nematode worms.

This species breeds in pine and spruce as well as larch and its tunnels often injure lumber for the most valuable uses.

Only two of these beetles, *D. simplex* and *I. balsameus,* can be considered as serious larch enemies, and this is the first time that I have taken *balsameus* from that tree. *D. simplex* is known to attack and destroy but slightly diseased larches under certain conditions, and those conditions I wish to discuss now very briefly. Previous to this season *D. simplex* had been rare in that neighborhood, but it came in in fairly large numbers this spring, attracted from a considerable distance by the dying larch bark. Only half the stumps were attacked by the spring swarm, but the progeny which matured in midsummer numbered thousands of individuals. These parents of the second brood entered the bark of the remaining stumps, and of the felled larch in the shade in great numbers. They did not attack the dried bark of the cord-wood, nor of the felled trees in the clearing. The individuals of the second brood at present in that swamp must number many thousands. Whether or not they are of sufficient number to successfully attack standing trees is a problem which I shall watch with interest next season.

If, after the available dying bark has been utilized by the beetles next spring, there are but few individuals left, they will gradually scatter in search of a further supply of bark in such condition. If, however, there are immense numbers in the swamp unable to find bark in the condition which suits them best, they may succeed in ovipositing in the bark of but slightly injured, or even healthy, trees, in which case the larvæ would probably mature and the trees be killed. When a few scolytid beetles attack a healthy tree, usually the vigorous flow of sap drives them back before the eggs are laid, and the tree suffers but little. When the number attacking a tree is very great, the many entrance holes and started tunnels check the sap flow so that the beetles succeed in laying their eggs and the resulting larvæ develop in the devitalized bark.

The level of numbers at which a species, usually not injurious, will attack healthy or but slightly diseased trees is known as the Pest Level.

It will be seen that a slight modification of the method of cutting would have averted any danger from these beetles. If the stumps had been cut lower a few blows of the axe would have removed most of the bark from each. If then all the trunks had been trimmed and left in the open sunlight of the clearing there would

have been but little sappy bark for the parents of the second brood, and they would have scattered from the region, leaving a very small and harmless second brood.

The pest level of *D. simplex* is high. It is perhaps rarely injurious. But the pest level of certain species attacking pine and spruce is low, and when that level is reached the finest trees of the region are in danger.

It can be easily seen from this that careful destruction of wastes from cutting is of utmost importance in lumbering operations, the more so that many other forest insects breed in such dying bark and wood.

The conditions which obtained in this larch bush will be found everywhere in Canada, in the woodlots, in the lumbering districts, and in our virgin forests.

In the great forests under natural conditions we find that when, through the agency of forest fires, heavy storms or the attacks of other insects, scolytid beetles find much dying bark in a suitable condition, they breed in this until they reach their pest level for those conditions; then they attack and kill the healthy trees. Witness the terrible destruction of *D. piceaperda* in the spruce of Maine and New Brunswick, as described by Dr. Hopkins.

In the lumber woods the present careless method of cutting leaves culls and refuse to breed these beetles and other forest pests by myriads.

I pointed out a few moments ago that scolytid beetles followed forest fires, breeding in the dying bark of injured trees. Dr. Hopkins, the leading forest entomologist of America, has shown that the relations are at times reversed; so that fires which would otherwise have caused no considerable injury, gain headway in districts of forest devastated by these beetles, and sweep as great conflagrations over square miles of territory.

It is well to discuss the injury which these forest insects are known to do, but can anything be done to check them in our timber limits and in our great forests?

The control of certain forest insect pests, e.g., the larch saw-fly, is, so far, beyond man's ability. But a method of control has been worked out whereby many forest pests, chiefly Scolytidæ, can be effectively kept below the pest level. Such methods have been successful in European forests, and in certain sections of the United States, and will most surely be followed in Canadian forests in years to come. They consist in modifications of the methods of cutting. Injured trees, with the bark filled with thousands of these beetles, are cut, and either barked or got into the water before the beetles emerge to start their tunnels in other trees. Either the barking, if done at the right time, or the immersion in water, destroys the greater part of the larvæ or adults. These beetles seem, perhaps invariably, to prefer dying bark. Therefore by girdling, early in the season, trees selected for later cutting, the greater part of the beetles in the immediate neighborhood can be attracted to the bark of these "trap-trees," and later these trap-trees are barked or got into the water early, so that the contained brood will be killed. The refuse, tops and branches, are destroyed, removing what would otherwise be a suitable breeding-ground for many species.

Such modifications in methods of cutting can be relied upon when control is needed.

Before such methods can be outlined, however, it is necessary to obtain much information from forest entomologists. The insect pests of our Canadian forests have been studied but little. There are many injurious forest insects in Northern Quebec and Ontario about which we know absolutely nothing. There is much work to be done, therefore, by the systematist; work which is absolutely essential. The practical entomologist must be able to distinguish with certainty the injurious

species when he finds them. For instance, if recently killed pines are found with the bark filled with *Ips pini*, there is little cause for alarm. The pest level of that species is high. The same is true of a new species of Phlœotribus, which I have from spruce, and many other, indeed most, scolytids of this region. These species prefer, and usually are able to find dying bark for breeding purposes. But if spruces are found with *Dendroctonus piceaperda* in the bark, the matter may be serious enough; for this species is quite capable of destroying the finest of the spruce over miles of territory if once it surpasses the pest level. Much work should be done in the near future in collecting and studying the forest insects.

It is further necessary to know the exact life histories of the injurious species in the regions where they are numerous. The lumberman must know when to girdle the trap-trees, when to cut them and others with the bark filled with the brood, and bark or immerse them. He must know how many broods occur, and just when they appear to attack fresh trees. Many things must be known before we can outline profitable methods for the control of many of these pests.

This information must be obtained by entomologists; and those of us who are interested in forest insects have a great field before us, a splendid opportunity, and also a serious duty.

Insect control is only one factor in the great problem of forest culture; but it is an extremely important factor, and the sooner we know the injurious insects of our great forests, and their life histories, the sooner will the control of forest insects be undertaken in the Canadian woods.

The great forests of the United States have been almost swept away by forest fires, insects enemies and careless cutting. Now, perhaps too late, the people there are awake to the importance of forest control. We in Canada are following exactly in their footsteps. Great fires—there are hundreds of fires in our Northern forests every season—insect devastations, careless cutting, little effort towards reforestation; it needs no prophet to foretell the result.

Quebec, New Brunswick, Nova Scotia and British Columbia will surely soon follow the lead of this Province in taking decided steps towards forest control. And that good time will come the sooner if we entomologists preach at every opportunity that most important practice in the control of insect pests and fungous diseases, whether in the field, the orchard, or the forest—*Clean Culture.*

INSECT NOTES FROM STE. ANNE'S —NOV. 15, SEASON OF 1910.

J. M. Swaine, Macdonald College, Que.

Orchard Insects.

The Apple Woolly Aphis, *S. lanigera,* has been gradually increasing in numbers with us for the last few years. It is found on many of our older trees in small masses, and is quite thickly scattered over the young orchard. On the young trees there is much more of it on the twigs than on the trunk just at this season, and the scars it causes are becoming numerous enough to need attention. Kerosene emulsion diluted 1-9 and driven in a strong stream controls it readily. I have never found the root form in Quebec, although it probably occurs in small numbers.

The Round-headed Borer, *Saperda candida,* occurs in very small numbers in our orchards; although it is common enough in an orchard about a mile away. At Cote St. Paul and at Rougemont it is doing serious injury.

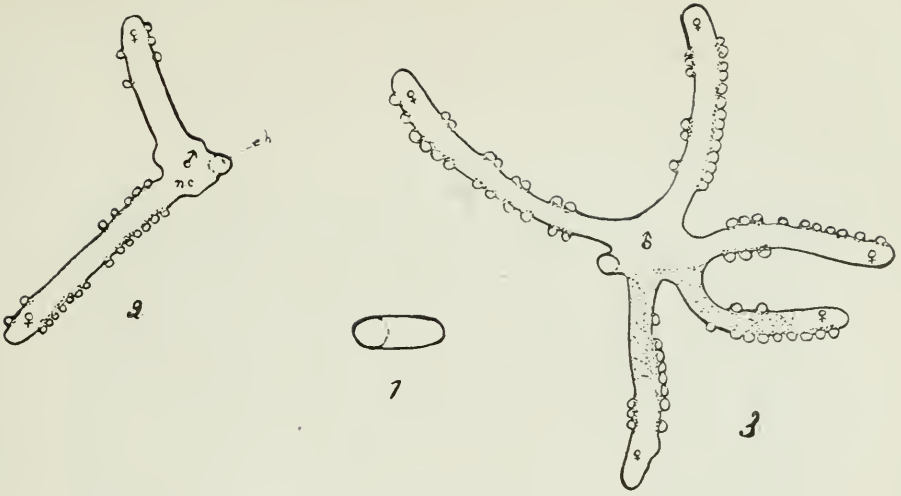

FIG. 8.
Work of *P. rufipennis*. Three stages in the development of the egg-tunnels.

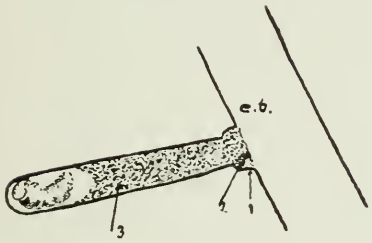

FIG. 9.
I. balsameus. Development of larval gallery. 1, egg-niche; 2, egg-packing; 3, chips and excrement of larva, darker in color; e.t., egg-tunnel.

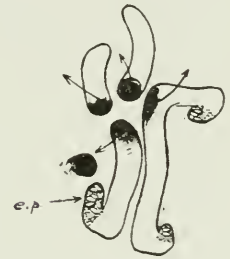

FIG. 10.
Larch Ips. Under side of bark.

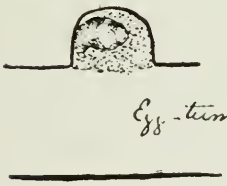

FIG. 11.
I. balsameus. Newly hatched larva.

FIG. 12.
The Larch Ips (24-V-10). Under side of the bark shown, with eggs in the pockets.

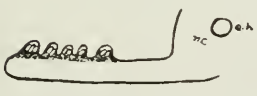

FIG. 13.
I. caelatus. From white pine.

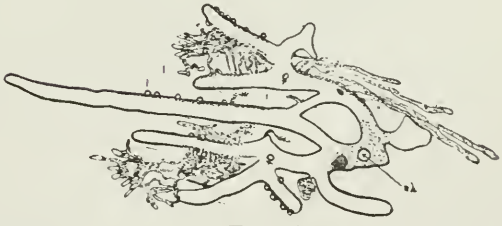

FIG. 14.
Dryocoetes autographus. Work in larch bark; larvæ one-third grown.

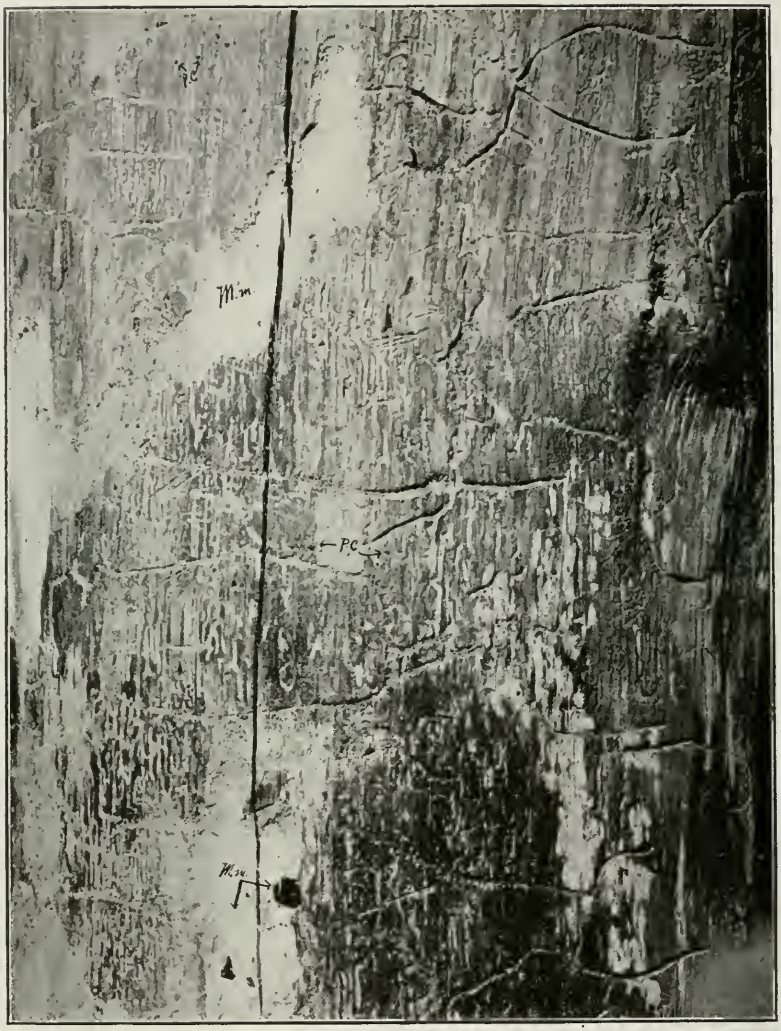

FIG. 15.
Work of *Ips balsameus* in Abies, showing the wood surface scored by the chambers, egg-tunnels, larval galleries, and pupal cells. The latter are often sunken as indicated at "p.c." The work of *Monohammus marmorator*, which was bred from that trunk, is shown at "M.m."

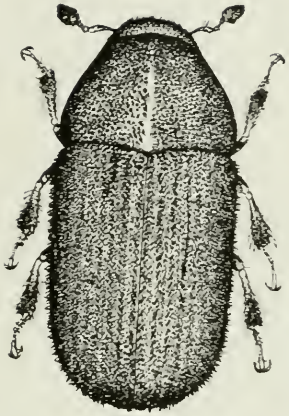

FIG. 16.
Polygraphus rufipennis
(Kirby).

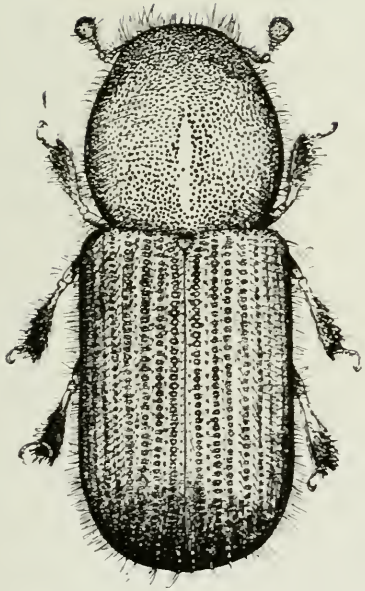

FIG. 17.
Dryocoetes autographus (Ratz).

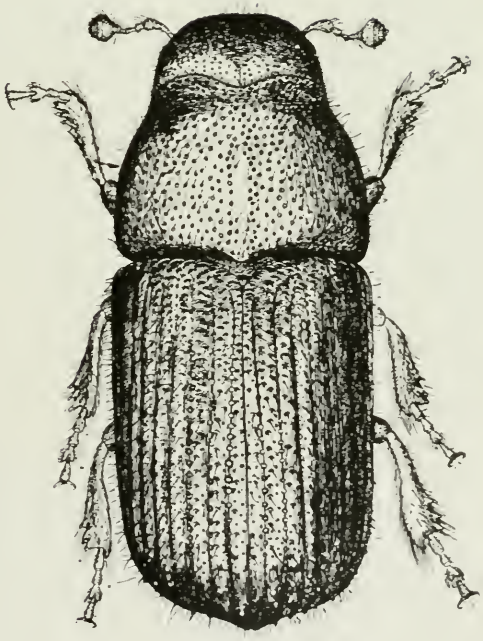

FIG. 18.
Dendroctonus simplex (Lec.).

The Flat-headed Borer, *Chrysobothris femorata,* is hardly found in our apple trees at all. And this is interesting, for the species is very common in the neighborhood, breeding in great numbers in fallen hickory and oak, particularly the former. This spring I took scores of specimens from one fallen hickory at Hudson, a few miles from Ste. Anne's. The beetles run about over the bark on fine days, mating and egg-laying, and fly very readily with a distinct "hum." Egg-laying begins with us on hickory in June, and lasts until late in July, although the greater part of the eggs are laid by the second week of July.

In our region at least the beetles much prefer dying hickory to apple trees in any condition, and I feel confident that Mr. Chittenden's suggestion that broken branches of hickory scattered about the orchard would trap most of the beetles, is one well worth trying when these beetles are injurious in orchards.

The Fruit Bark-beetle, *Eccoptogaster rugulosus,* is not yet to be found in our orchards. I have never taken any indeed in this Province.

The Peach-tree Bark beetle, *Phloeotribus liminarus,* was found in great numbers this season in wild cherry near the college. Over a score of large trees were studded with the gum from its entrance holes, although the beetles succeeded in breeding in very few of them. The entrance holes, and in a few places on some trees the egg tunnels, were cut this spring but very few eggs were laid. Again on the tenth of August, light coloured adults were starting tunnels in the bark.

Next year these cherry trees will probably have a hard time of it. They had enemies enough before, indeed, for the common cherry borer was altogether too plentiful.

Xyleborus dispar I have never taken in Quebec. A close ally, *X. serratus,* is very common in several forest trees, notably in yellow birch.

Last spring I bred from apple-twigs sent from Cambridge, N. B., a species of *Oberea,* which is possibly *O. tripunctata.* The female cuts three rows of bites and lays the egg between the bark and the wood above the second row. The grub feeds at first in the dying tip, and later bores downwards through the twig. The twigs are found dead during the summer and are frequently broken by storms. The injury is not serious, as yet, but the species may easily become an injurious pest.

The Buffalo Tree-hopper, *Ceresa bubalus,* has badly scarred several of our young trees. The cuts were made on both the stems, which are very small, and the branches. Soft maple seems to be preferred by this insect for egg-laying, and until the young maples were cut away from near our orchard the fruit trees were left entirely alone.

The Bud Moth, *Tmetocera ocellana,* was present in considerable numbers in our young orchard this season. Owing to lack of labor, early sprayings had to be omitted, and the result is intimated in the accompanying photograph. A poison spray, late in July, should control this insect effectively for the next season. The caterpillars begin to pupate about June 10 with us. The first adults appeared in the cases June 28, but empty cases were found in the field as early as the 18th.

When our orchard is sprayed with lime sulphur, winter strength, early in spring, we see little of the bud-moth, the case-bearers, or the leaf-aphides. I do not say that lime sulphur controls these insects, but our experience, so far, seems to indicate it.

The Cigar Case-bearer of the Apple, *Coleophora fletcherella,* was unusually abundant on our fruit trees this summer, and apparently the same species was breeding on thorn. The larvæ ceased feeding about June 15th, this season, and the first pupæ were found on the 20th. The first adults appeared in the cages on

Fig. 19.

Tmetocera ocellana, Bud-moth. Work on apple-leaves.

June 29th, and on the same day a larger, distinct, undetermined species of *Coleophora* was bred from cases on the thorn.

The Pistol Case-bearer of the Apple, *C. malivorella,* was present also in considerable numbers.

The Permanent Apple Aphis, *Aphis pomi,* was exceptionally numerous this season, and with it many *A. sorbi.* The leaves were badly curled, but its parasites controlled it before serious injury was done. Very few Aphides of either species could be found on the trees during the summer, but early in October both species were again common, and the leaves were curling badly. *A. pomi* was vastly more numerous, however, and seemed responsible for the curling. It has been reported that the leaf curling was due mainly to *sorbi.* It does not seem so with us. K. emulsion, or better, fish oil soap, about the middle of October would effectually control them for the following season; and lime sulphur, 1.04 S. G., sprayed in the early spring seems to be effective. Even in Quebec, where the San José is as yet practically unknown, a regular annual spray of lime sulphur, 1.04 S. G., seems a most excellent orchard practice.

The Apple-tent, *Malacosoma americana,* has its cycles with us, as elsewhere, and just now is on the increase. Many egg-masses are found this fall, whereas for the last two years but few were to be had. The Leaf-roller, the Leaf-crumpler, and two Leaf-miners have been common but not injurious.

The Codling-worm, *Carpocapsa pomonella,* has furnished us nothing new; except perhaps that it has discovered that we want it for class use and refuses to spin its cocoons on the trees. For some reason or other we found only about six cocoons on the trees this spring, although the species is not by any means rare.

The Plum Curculio, *C. nenuphar,* is not troublesome in our apples, although it will soon be a plum pest with us—our plums are just beginning to bear. The species causes more injury to apples than any other insect in some Quebec localities. As an apple pest I am quite of the opinion that it can be partially controlled by having a few plum trees in the orchard as traps. Thorough spraying with poison for the codling-moth, and rigid destruction of all fallen "wormy" fruit usually controls this pest.

The Apple Curculio, *A. quadrigibbus,* is injurious in a few Quebec localities, notably in Covey Hill region. A large orchard there has a considerable portion of the fruit distorted this season, and I think much of the injury is due to the punctures of this pest. Careful destruction of the fallen fruit is of importance in the control of this insect, and jarring is of use on small trees. Probably it is effectively controlled by spraying regularly for the codling-worm. This curculio lays its eggs in a simple puncture, and does not cut the crescent-shaped slit as does *nenuphar.* It pupates within the apple fruit.

The Apple Maggot, *T. pomonella,* is found in but few localities in Quebec, notably at Como, and in the region about Hemingford and Covey Hill. It has been effectively controlled at Como by careful destruction of the fallen fruit. That is, so far as known, the only effective method of control.

The San José we do not know in Quebec, although it has been reported from one place this summer near the Ontario line. *A. ostreæformis* was found here this season on plum trees. Our only apple scale is the Oyster-shell, *L. ulmi.* It is, however, often injurious, and is too frequently overlooked. There is no excuse for its presence in injurious numbers. Lime-wash in the late fall, or lime-sulphur in the early spring, with a contact-spray as the young appear in the late spring effectively control it. It is in neglected orchards that we find the Oyster-shell in abundance.

The Canker worms, *A. pometaria,* and *vernata,* trouble us but little at Ste. Anne's. In parts of Quebec, however, they are of local importance, and in the Annapolis Valley of Nova Scotia are among the worst of the apple pests. Under ordinary circumstances we recommend lead arsenate, applied as needed, and *when the caterpillars are small.* Carefully applied, and carefully watched bands of tree-tanglefoot are perhaps profitable in the districts worst affected. The males and females of *A. pometaria* have been common here this fall and were abundant until late in November; but we find most about the maple trees.

Small Fruits.

The Currant Span-worm, *C. ribearia,* has become a pest with us. Its spotted looping caterpillars feed voraciously, and seem harder to kill than the common saw-fly larvæ. Paris green is always effective, and plenty of hellebore will do the work. The caterpillars are very common early in June, and pupate the last of the month. The first moths appeared in our cages on July 4th, but were found outdoors on June 29th. The egg-laying period extends over several weeks.

The Currant Borer, *Sesia tipuliformis,* has nearly ruined a currant patch in this neighbourhood. Last year, on July 9th, we noticed a number of dying canes, which proved to have been killed by larvæ of this species. The larvæ had escaped and only two parasitized pupæ were found. There was nothing to be done then, of course, as the moths were all out and egg-laying partly over. This season by April 14th the larvæ were working in the canes in which they had wintered. While small they keep to the pith and may be found in all parts of the cane. Their work leaves a black tunnel through the centre of the cane, and the species may be recognized by this character of their tunnels. When full grown the larva spins a cocoon within the cane near an exit hole through the side previously cut by it. Shortly after the cocoon is spun the larva pupates. Often these pupæ wriggle from the cocoon and project, head foremost, from the opening, after the fashion of other Lepidopterous wood-boring species, thus enabling the moth to emerge without touching the wood. In many instances, however, the pupa-cases remain within the cocoons. In the laboratory cages the later stages are passed rapidly, and give little indication of the condition in the field. Larvæ pupated in the cages on the 1st of May, and emerged seven days later; but on this date, May 8th, the caterpillars outdoors were still feeding, and only a few even spinning cocoons. The first pupa was found outdoors on May 11th, and the greater number of the adults were flying during the third week in June. Mating and egg-laying take place at this time. The moths are extremely active, darting back and forth over the patch during the sunshine, but disappearing in cloudy weather. The eggs are laid on the canes, and the larvæ enter the canes and feed for the rest of the season, becoming perhaps two-thirds grown by winter time.

The injury to the canes appears in June, or late in May, usually about the time of pupation. The leaves wilt, turn yellow and fall, and the cane rapidly dies. Occasionally the canes survive the attack and bear fruit the following season. In these cases the old exit hole can be found in the side of the cane.

This insect is a very injurious pest, and quite capable of completely destroying a large plantation in a few years. The only method of control consists in rigidly destroying, *burning,* the diseased canes, as soon as they can be distinguished. Usually they are noticeable after, or even before, pupation, and can always be detected after pupation by the exit holes.

Our experience with this insect illustrates very well the value of clean culture in insect control. The moths appeared in the currants suddenly and in great numbers. They came from a row of old, neglected currants in a nearby orchard. They had bred in those canes, increasing in numbers, until finally there were no sound canes left. Then they took the shortest route to the currants first mentioned, about eight hundred yards away.

It is true of many of our injurious insects that a rigid system of clean culture is the cheapest and most effective method of control. Clean culture is a gospel well worth preaching. It would save our farmers and orchardists many thousands of dollars every year if rigidly practised; and the expense would be small. I know an apple orchard carefully sprayed and cared for, yet badly infested with apple pests every year. Why? Because just over the fence is a neglected orchard of perhaps fifty trees. These trees are worthless and absolutely uncared for. They serve, however, to breed apple insects for the whole neighbourhood. Clean culture even with us in Quebec is one of the most important factors in successful fruit-growing. In Ontario it is even more important, for here you have serious pests, the San José, and the bark-beetles, which we do not need, as yet, to consider.

Another currant borer, *Psenocerus supernotatus,* bred in considerable numbers in our canes this season. The beetles breed in the tips of the canes, and seem to do but little damage.

The Raspberry Cane-borer, *Oberea bimaculata,* was particularly numerous this season in raspberries. The adults appeared about June 20th, and were present in great numbers until the last of the month. Scores of specimens were picked from the canes during mid-day. Probably the same species breeds commonly here in wild raspberry and blackberry. Egg-cuts found here this season on roses may have been from *O. b. basalis,* a species which Mr. Morris, of Port Hope, has taken this season from rosebushes.

The Currant Saw-fly and the Currant Aphis were of course more or less common but easily controlled. I notice that currant growers seldom bother much about the late appearing larvæ of the former. Where these are killed the first brood of the succeeding season is usually few in numbers. The Currant Aphis appears to spread but slowly, at least with us. I have been watching it for three years now on a small group of canes where it is allowed to breed. Although it curls up practically every leaf on those bushes every season, it has so far caused no trouble in our plantation some thousand yards away.

The Grape-Vine Root-borer, *Fidia vitticida,* appeared in our vineyard three years ago in small numbers. The characteristic holes in the leaves were quite evident. Possibly our cold winters are too much for them for we have never seen the species since.

MISCELLANEOUS.

The Rust Fly, *Psila rosæ,* has appeared in Montreal Island, and threatens to render carrot raising a precarious business. It has long been a serious pest in the Maritime Provinces and in Eastern Quebec, but until recently has been rare with us. It is difficult to control, and I know of nothing better than the practice recommended by Dr. Fletcher, of spraying with kerosene emulsion every ten days from the time the carrots are thinned until four or five sprays have been given. The spray should soak the ground about the roots.

The Clover-root borer, *Hylastinus obscurus*, is widely spread throughout the Montreal region. Apparently it will soon allow but one good crop of clover in our neighborhood.

Red and Mammoth Clovers are seriously injured; and I find the beetles breeding also in Alsike and in Crimson Clover, but not to an injurious extent. They sometimes start their tunnels in White Dutch and Sainfoin, but I have not so far found them breeding there. Alfalfa and sweet clover are not affected here.

The beetles started their tunnels here this season in the last of May and first part of June. They cut an entrance hole either in the base of the crown or through

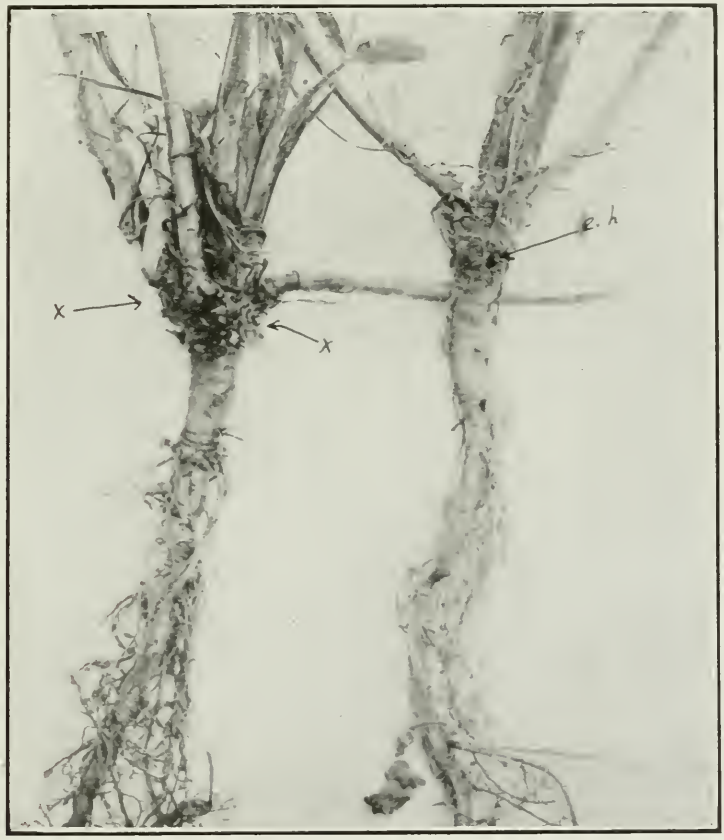

FIG. 20.
Hylastinus obscurus. Work in clover roots. *e.h.*, entrance hole; *x.*, borings of adult beetle. The crown would separate easily from the root.

the side of the root, and continue a cylindric tunnel down the root, sometimes near the surface, sometimes deeper into the tissue. Along the sides of the tunnel shallow niches, egg-niches, are cut, and in these the eggs are deposited, one in each niche. The larvæ bore irregularly through the substance of the root, and as the majority are working just below the crown the tissue is there often largely destroyed. The crown for this reason frequently breaks away from the root when an attempt is made to pull the plant. The first pupæ are formed the third week in July, and from this time until the first week in October pupæ are always to be found. On October 10th, this season, a very few pupæ were obtained, but nearly all had trans-

formed. When these beetles are established in a section there is apparently no practical method of control. But this is perhaps not unfortunate for it is usually considered the best farm practice to take out one crop of clover from a rotation, and the first crop is not commonly affected seriously, although clover planted in May is sometimes attacked in numbers the following spring and the first crop injured. Plowing under the sod as soon as the first crop is cut should always be practised when this insect is common. Many of the larvæ can thus be destroyed.

The Cabbage maggot was more injurious this season than in other years, and the onion maggot was present though not in great numbers.

Anisota senatoria has been extremely numerous in the district between Howick and Hemingford. Many oaks through that country were completely stripped last season by hordes of these caterpillars.

FIG. 21.
Hylastinus obscurus. Tunnel and eggs.

FIG. 22.
Hylastinus obscurus. Tunnel and eggs.

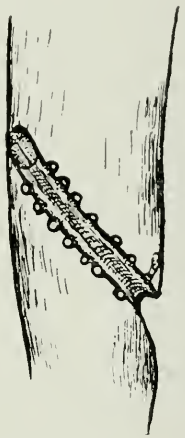

FIG. 23.
Hylastinus obscurus. Eggs in the egg-niches, with adult beetle in the end of the egg-tunnel. (Twice enlarged.)

Grasshoppers were not so serious a pest in this province as in the last three years, but still were very numerous in some localities. In sections where the grasshoppers were very destructive two or three years ago but were not numerous this season, the blister-beetles, whose young feed upon grasshopper eggs, were reported very plentiful. "Criddle mixture" and "Hopper-catchers" would save many dollars in the grass and grain fields of this province in grasshopper years. The Blister beetles mentioned above, mostly *M. unicolor,* were injurious in a few places. Their young, apparently, do much to control the grasshoppers, and the adults should not be destroyed unless they are really doing injury.

The Fall Web-worm which has been so abundant on shade and forest trees for several years seems to be decreasing in numbers. The White-marked Tussock, which was so injurious in Montreal recently, has not yet revived from the attack of its parasites.

Otiorynchus sulcatus has been doing considerable injury to cyclamen and primroses in two of the Montreal greenhouses. Injury was reported from the feeding of the adults on the flowers; and the larvae which live in the soil, destroyed the roots, and even fed upon the corms of the cyclamen. Carbon bisulphide has had no effect upon the larvæ. Probably carbolic acid emulsion or strong kerosene emulsion will be effective. We are not yet able to report any success in its control. Only two sets of greenhouses were affected so far as we know; others near by were not at all troubled.

The Apple-leaf hopper, so injurious here on potato and other crops in 1908 and 1909, was not numerous this season.

The Cucumber beetle, *D. vittata.* was again injurious throughout this district. It certainly seems to prefer squashes to melons and cucumbers; and can be effectively kept from the two last by having a few "trap plants" of squash growing close by. These "trap" squashes should be covered with Arsenite, dusted on in large quantity, as soon as the beetles appear, and at the same time the valuable crop should be sprayed with Bordeaux, which the beetles dislike. Many beetles can in this way be poisoned during the first few days of their feeding. By repeating the spray of Bordeaux on the main crop as often as needed, and leaving the "trap" squashes unsprayed the beetles can be kept away from the cucumbers and melons. The same method is effective in squash fields; a few plants being used as "traps" and the rest being covered with Bordeaux. For several years I have had squash, melons, cucumbers, and pumpkins growing close together. The squashes have always been attacked by the beetles. but the melons and cucumbers have escaped completely, and without treatment.

The Spruce Budworm, *Tortrix fumiferana,* was noticed in small numbers at Hudson. The Larch Sawfly, *N. erichsonii,* was present, but did little damage.

BASSWOOD OR LINDEN INSECTS. IV.

Arthur Gibson, Ottawa.

In 1904, the writer published, in the annual report of this Society, notes on 94 different species of insects which had been found attacking *Tilia americana* L. In 1906. notes on other species were contributed which brought the list up to 102, and, in 1907, a further paper increased this latter number to 122. The following additional notes have since been made.

ATTACKING THE FOLIAGE.

Order Homoptera.

123. *Ceresa constans* Wlk. This insect has been found commonly on basswood at the Beaver Meadow, Hull, Que. in August and September, by Mr. W. Metcalfe. Mr. Van Duzee has also found the species on basswood near Buffalo, N. Y.

104 of 1906 list. *Telamona reclivata* Fitch. This species was collected on September 26, 1907, and again on Sept. 2, 1908. The 1906 specimens were taken on July 1.

124. *Cixius basalis* Van D. Beaver Meadow, Hull, Que. August 11, 1907, (Metcalfe.)

125. *Amalopota uhleri* Van D. Ottawa, Aug. 25, 1907, (Metcalfe.) This insect has been recorded as feeding on maple.

126. *Gypona albosignata* Uhl. Beaver Meadow, Hull, Que. Sept. 1, 1907, (Metcalfe.)

109 of 1906 list. *Diedrocephala coccinea* Forst. This species was abundant in 1905 but the specimens were not identified until 1907. (Det. by Heidemann.) Pupæ which were found on July 7, produced the perfect insects on July 10.

Order Hemiptera.

127. *Lygus tenellus* Uhl. MS. This species was collected by me from basswood on June 27, 1905, the determination being made by Mr. Van Duzee. In 1907, Mr. Metcalfe also found the same insect on linden at the Beaver Meadow, Hull, Que. on Aug. 11.

128. *Lygus monachus* Uhl. Mr. Metcalfe found this species commonly, at Ottawa, on basswood on July 1, 1904. In Miss Murtfeldt's account of this bug in Bulletin No. 13 of the U. S. Division of Entomology, the insect is stated to have been found infesting the growing points of young maples (*Acer dasycarpum.*). Besides maple, alder is also given as a food plant and " many other kinds of small trees and shrubs." The insect evidently has a wide range of food plants.

129. *Camptobrochis nebulosus* Uhl. Beaver Meadow, Hull, Que., Aug. 11, 1907, (Metcalfe). Box-elder and willow are also recorded as food plants for this insect, the former by Baker and the latter by Gillette.

Order Lepidoptera.

19 of 1903 list. *Ennomos alniaria* L. In 1906, Mr. Young found the larva at Meach Lake, Que. This was the first record of its feeding on basswood in the Ottawa district. On Sept. 2, 1908, the writer found a mature larva which measured two and one-eighth inches long, also feeding on basswood, on the Experimental Farm.

130 *Pyrausta pertextalis* Led. Larvæ of this pyralid were found on basswood at Ottawa in June, 1908, the moths emerging June 27.

131. *Archips fractivittana* Clem. A single larva which produced this moth was found on basswood in 1908. It pupated on June 1, and the moth emerged on June 10. A brief note reads "larva like *rosaciana.*"

Order Hymenoptera.

67 of 1903 list. The Willow Sawfly, or American Cimbex, C. *americana* Leach. A single specimen of this larva was found by the writer feeding on basswood, at Ottawa, on October 8, 1907. This specimen, instead of being the usual pale yellow colour, was of a light vermilion shade.

Order Acarina.

69 of 1903 list. The Linden Gall Mite, *Phytoptus abnormis* Garman. Very abundant at Ottawa in June 1908. Some leaves were much infested; quite a few of the galls were on the undersides of the leaves.

OCCURRING ON THE BARK.

ORDER HOMOPTERA.

132. *Lachnus dentatus* LeB. Specimens of apterous females, depositing eggs on basswood were shown at the annual meeting of this Society, at Guelph, on 31 Oct., and 1 Nov., 1907, by Dr. Bethune and Mr. Jarvis. This is probably the species which I found on the same tree at Ottawa a few years previously. In Packard's Forest Insects, the insect is mentioned as having been found on the branches of willow and also on small nursery apple trees.

133. *Pulvinaria vitis* Linn. This species is recorded from Western Ontario as occurring on *Tilia americana,* (Jarvis, Rep. Ent. Soc. 1907, p. 51). In Mrs. Fernald's Catalogue of the Coccidæ of the World the only food plant mentioned is grape vine.

134 *Toumeyella liriodendri* (Gmel.) Ottawa, (Jarvis, Rep. Ent. Soc. Ont., 1907, p. 51).

135. *Aspidiotus æsculi* Johns. Mr. Jarvis records this scale insect as infesting basswood at Toronto, Brantford and Guelph (Rep. Ent. Soc., 1907, p. 51). In Mrs. Fernald's Catalogue *Æsculus californica* is mentioned as the food plant and the habitat given as California.

136. *Aspidiotus diffinis* Newst. Mrs. Fernald records this species as occurring on basswood as well also as on lilac. Jarvis lists the species from basswood, from Guilds, Ont. (Rep. Ent. Soc. Ont., 1907, p. 51).

137. *Aspidiotus juglans-regiæ* Comst.

138. *Aspidiotus ulmi* John.

In April, 1907, Mr. J. Fred. Smith, late Provincial San José Scale Inspector, sent to the Division at Ottawa some basswood heavily infested with scale insects. The wood was taken from a tree near Beamsville, Ont. The material was sent to Dr. Howard, at Washington, and was reported upon by Mr. Marlatt as follows: "The scale insects on basswood from Mr. J. F. Smith are of two species, viz. *Aspidiotus juglans-regiæ* Comst. and *Aspidiotus ulmi* Johnson." *A. juglans-regiæ* has a wide range of food plants. Mrs. Fernald mentions walnut, apricot, apple, pear, peach, cherry, Japan plum, locust and maple. *A. ulmi* is recorded from elm, catalpa and *Cycas revoluta.*

THE ENTOMOLOGICAL RECORD FOR 1910.

ARTHUR GIBSON, OTTAWA.

The season of 1910 in Canada was, on the whole, a most favorable one for the collection of insects. Reports from many widely separated localities refer to the remarkably fine and dry weather. In the east, the season was much drier than that of 1909. From the many interesting records sent in, the year, too, has been an improvement with regard to the number of rarer forms which have been collected. As yet, of course, much material gathered in 1910, still remains to be worked up. As this is done a mention of the more interesting species, it is hoped, will be made in future issues of the Record. In the present Record are included notes on a number of rarer forms collected in other years, but only studied in 1910.

The compiler of the Record is exceedingly grateful to his many friends who have either helped him by sending in records for the "Notes of Captures", or in giving assistance in the identification of doubtful species.

Canadian collectors and students, as in previous years, have received invaluable help from the leading specialists in the United States and elsewhere. Particular acknowledgment is due to Dr. L. O. Howard, and his expert associates, Dr. H. G. Dyar and Mr. W. D. Coquillett, of Washington, D.C.; Dr. J. B. Smith, of New Brunswick, N.J.,; Sir George Hampson, of the British Museum; Mr. W. D. Kearfott, of Montclair, N.J.; Prof. H. F. Wickham, of Iowa City, Iowa; Mr. E. P. Van Duzee, of Buffalo, N.Y.; Mr. W. Beutenmuller, of New York, N.Y.; Dr. Henry Skinner, of Philadelphia, Pa.; Dr. E. M. Walker, of Toronto, Ont.; Col. Thos. L. Casey, of Washington, D.C.; Mr. Chas. Leibeck, of Philadelphia, Pa.; Rev. G. W. Taylor, of Departure Bay, B.C., Mr. C. H. Roberts, of New York, Mr. J. D. Evans, of Trenton, Ont., Mr. W. H. Harrington, of Ottawa, and Mr. F. H. Wolley-Dod, of Millarville, Alta. Mr. Dod is specializing in North American noctuidæ and will be pleased to name and return any specimens submitted to him.

Literature.

Among the many valuable publications which have been received during the past year, and which are of interest to Canadian students, mention may be made of the following:—

Banks, Nathan. Catalogue of Nearctic Spiders. Smithsonian Institution, United States National Museum, Bulletin No. 72. This publication takes the place of the Marx Catalogue prepared some twenty years ago. The author states that the catalogue includes a little over 1,300 species. "The largest family is the Theridiidæ, with 298 species; the Attidæ is next with 213; two other families, the Lycosidæ and Epeiridæ, have over 100 species in each. Sixteen families have less than 10 species apiece." This work will be a most useful one. Many of the species occur in Canada., but comparatively few definite records are available. The publication of this catalogue will undoubtedly lead to more systematic work, and it is to be hoped that entomologists in Canada will do their share in working up local species.

Beutenmuller, William. The North American species of Neuroterus and their Galls, (issued May 20, 1910); The North American species of Aylax and their Galls, (issued May 20, 1910); The North American species of Aulacidea and their Galls, (issued July 16, 1910): American Museum of Natural History, New York. These papers are a continuation of the results of Mr. Beutenmuller's studies on American Cynipidæ and their Galls. They are very useful publications. The illustrations are particularly good: in fact they could not be otherwise, coming from the hand of Mrs. Beutenmuller. Several Canadian records appear in the above contributions.

Blatchley, W. S. The Coleoptera or Beetles of Indiana; Department of Geology and Natural Resources: Bulletin No. 1, State Printers, Indianapolis; 1386 pages, with nearly 600 excellent illustrations. No book has appeared during the year which will give such general pleasure to entomologists as Professor Blatchley's magnificent work on the beetles of Indiana. Such a work has been much wanted, and although the author has confined it to the above State, it will, nevertheless, be of the greatest use to students in Ontario and other parts of Canada. Many of the species which occur in Indiana are to be found in Canada, and from the descriptions of families and genera and the keys to the genera and species and the descriptions thereof, students are now able to run down many insects which otherwise could only be determined by the specialist. Unfortunately the edition of this work is small, and many, doubtless, will be unable to obtain a copy.

Casey, Thos. L. Memoirs on the Coleoptera, 1: New Era Printing Co., Lancaster. Pa.; issued September 24, 1910. This memoir, of 205 pages, by Col. Casey, the well-known student of coleoptera, is indeed an important publication. It is divided into 2 parts: 1—New species of the Staphylinid Tribe Myrmedoniini; 2—Synonymic and descriptive notes on the Pæderini and Pinophilini. Altogether 365 species are described as new, 25 of which are from Canada. Of these 25, all but two occur in British Columbia, and were mostly collected by the Rev. J. H. Keen, the enthusiastic naturalist, at Metlakatla. The two other species are from Ontario, one collected at Toronto and one at Ottawa. This further work on Staphylinid beetles will be of great interest to coleopterists. Such memoirs represent much close study, and the author deserves great credit for this additional contribution to the knowledge of these insects which are so difficult to study.

Coquillett, D. W. The Type-species of the North American Genera of Diptera. Proc. U. S. Nat. Museum, Vol. 37, pages 499-647: published August 4, 1910. "The great importance of knowing definitely what species is the type of any given genus is now recognized by practically every worker in the field of biology." This important contribution is the result of several years of work in ascertaining the types of the genera of diptera reported as occurring in North and Middle America. It contains all the genera known to the writer up to January 1, 1909, together with their type-species and synonymy. Students of diptera will find this publication of extreme value. In the *Canadian Entomologist* for November, 1910, Mr. Coquillett points out several corrections and omissions to the above paper, which should be noted by those who possess a copy of the article.

Dietz, W. G. Revision of the Blastobasidæ of North America. Trans. Amer. Ent. Soc., Vol. xxxvi, Jan.-March, 1910, pp. 1-??, plates I.-IV. This interesting paper deals with 66 different species, several of which are recorded from Canada. Thirty-six are described as new. The author states in the beginning of the paper that "the Blastobasidæ, as now understood and distinguished from the Œcophoridæ, form a well defined family of the Tineina. This revision will be of much use to students of the microlepidoptera. Doubtless many others of the species listed will be found in Canada.

Grossbeck, John A. Studies of the North American Geometrid Moths of the Genus Pero. U. S. Nat. Museum, Vol. 38, pages 359-377, with Plates 13-16: published August 19, 1910. In this interesting paper Mr. Grossbeck gives the results of his investigation in the above named genus (= *Acelina* Guenee in part). Long series were gathered together from different parts of the United States and Canada, and four new species recognized. Four plates are added, one of these figures the adult moths, another structural characters and the remaining two show the genitalea of the species.

Hampson, Sir George F. (Bart.). Catalogue of the Lepidoptera Phalænæ in the British Museum, Vol. IX, Noctuidæ, 1910, 552 pp., plates cxxxvii to cxlvii. Received May 2. This volume "is the third and final part of the very large Noctuid subfamily *Acronyctinæ*: it contains 725 species belonging to 185 genera, as compared with 843 species belonging to 96 genera in Vol. VII. and 720 species belonging to 104 genera in Vol. VIII." Many of the species figured in the beautiful plates occur in Canada, and owing to the great care of the artist, in most instances, it is an easy matter to determine our North American forms. These volumes are eagerly looked forward to by lepidopterists. Vol. IX. is extremely interesting as it deals with many species which have of recent years been studied by American entomologists. Collectors in Canada should assist Sir George Hampson in his great work by sending him material from their respective districts. In this

way, of course, future volumes will be made much more useful for those who are studying specially the lepidoptera of our country.

JOHANNSEN, O. A. The Mycetophilidæ of North America: Maine Agric. Exp. Station, Bull. 172, Part I, (March, 1910), pp. 209-276, plates 3; Bull. 180, Part II, (June, 1910), pp. 125-192, plates 4. This monographic treatment of the Fungus Gnats of North America is a most valuable contribution to our knowledge of diptera. In Part I the lower and economically less important subfamilies Bolitophilinæ, Myçetobiinæ, Diadocidiinæ, Ceroplatinæ and Macrocerinæ, are treated; in Part II the Sciophilinæ are dealt with.

KIRBY, W. F. A Synonymic Catalogue of Orthoptera, Vol. III, Locustidæ vel Acridiidæ; British Museum (Natural History), March, 1910. This volume completes Mr. Kirby's general Catalogue of the Order Orthoptera. It is a book of 674 pages, and therefore considerably larger than Vols. I and II. This is owing to the fact that the Locustidæ (the short-horned Grasshoppers or Migratory Locusts) is a much larger family than the others. This work will be of the greatest use to systematists, and now that the whole Catalogue has been completed, the order Orthoptera will doubtless attract more and more students from year to year. Pages 562 to 586 are given up to "Additions and Corrections" to the three volumes.

MUTTKOWSKI, RICHARD A. Catalogue of the Odonata of North America: Bulletin of the Public Museum of the City of Milwaukee, Vol. I, article I, pp. 207. This well prepared catalogue, which was issued on June 27th, is a publication which will be widely welcomed by students of the Odonata. Such a catalogue has been much wanted. It presents in convenient form what purports to be a complete list of these insects from the North American region. The author has had the cooperation of the leading students in this order in the preparation of the catalogue; the classification and nomenclature employed, therefore, represents the more approved and advanced ideas of odonatologists. The publication is an important one, and should be in the hands of all Canadian students of these neuropteroid insects.

PIERCE, W. DWIGHT. A Monographic Revision of the Twisted Winged Insects comprising the Order Strepsiptera Kirby. Smithsonian Institution: U. S. Nat. Museum, Bulletin 66. Received Jany. 7, 1910. In this extensive contribution of 232 pages, 37 genera are treated of, comprising 103 species. Sixty-two new species are described from North America. The introductory chapters on "History" and "Biology" give much information about these interesting insects, which have been so little studied by North American students. Fifteen plates appear at the end of the Bulletin.

ROHWER, S. A. On a Collection of Tenthredinoidea from Eastern Canada. Proc. U. S. Nat. Museum, Vol. 38, pages 197-209; published June 6, 1910. This paper is a report of an interesting collection of sawflies made by Mr. A. Gordon Leavitt, in the County of St. John, New Brunswick. Fifty-three different species are listed, 12 of which are described as new.

SMITH, JOHN B. A List of New Jersey Insects: Annual Report of the New Jersey State Museum, 1909; pp. 888. This report, with the exception of 13 pages, is devoted to Dr. Smith's New List of the Insects of New Jersey. No less than 10,385 different species are listed, comprising 3,486 genera and 331 families. In the 1899 list 8,537 species were included. Considerable progress has therefore been made in a knowledge of the insects of the State. This List is an extremely useful publication. Unfortunately its edition is limited, and it will be impossible to supply everyone who will want this work with a copy.

Snodgrass, Robert Evans. The Thorax of the Hymenoptera. Proc. U. S. Nat. Museum, Vol. 39, pages 37-91, with plates 1-16: published October 25, 1910. In this paper the author gives much extremely useful information on the thorax of hymenopterous insects. In such a study it was necessary, of course, to make many dissections and drawings. The reproductions of these latter are particularly good. In addition to the 77 figures on the plates, 16 other figures appear in the text.

Wheeler, William Morton. Ants: Their Structure, Development and Behavior. New York: The Columbia University Press, 1910. This remarkable book of 663 pages is one of the most important contributions to the literature of entomology which has appeared during the year. It is a work that has been much wanted and will be of extreme value the world over. The book is divided into thirty chapters, each of which contains a number of parts. Chapter I treats of "Ants as Dominant Insects." This is followed by chapters on external and internal structure, development, polymorphism, history of myrmecology and classification of ants, distribution, fossil ants, etc. At the end are several appendices: A—Methods of Collecting, Mounting and Studying Ants; B—Key to the subfamilies, genera and subgenera of the North American Formicidæ, for the identification of the workers; C—A list of described North American ants; D—Methods of exterminating noxious ants: E—Literature. Beautiful illustrations appear throughout the text. This magnificent work will undoubtedly lead many to make serious studies of these most interesting insects, about which so much reliable information has now been made readily available.

Williamson, Edward Bruce. The North American Dragonflies (Odonata) of the Genus Macromia. Proc. U. S. Nat. Museum, Vol. 37, pages 369-398, with plates 35-36; received 7 Jany., 1910. This paper on the genus Macromia will be of much value to students of dragonflies. The American species are distributed generally over the United States and Southern and Eastern Canada. Nine species are treated of at length, three of which are described as new. Seven figures, showing wing venation, are included in the text.

The following is a list of names and addresses of collectors heard from during 1910:—

Anderson, E. M., Provincial Museum, Victoria, B. C.
Baird, Thomas, High River, Alta.
Baldwin, J. W., 74 Besserer Street, Ottawa.
Bethune, Rev. Prof., O. A. C., Guelph.
Boulton, A. R. M., care King Brothers, Quebec, Que.
Bush, A. H., 1105 Ninth Ave., Vancouver, B.C.
Carr, F. S., Edmonton, Alta.
Chagnon, Gus., Box 186, Montreal.
Cockle, J. W., Kaslo, B.C.
Crew, R. J., 561 Carlaw Ave., Toronto.
Criddle, Norman, Treesbank, Man.
Dawson, Horace, Hymers, Ont.
Day, G. O., Duncans, B.C.
Dod, F. H. Woolley-, Millarville, Alta.
Evans, J. D., Trenton, Ont.
Fyles, Rev. T. W., Hull, Que.
Gibson, Arthur, Experimental Farm, Ottawa.

Groh, H., Experimental Farm, Ottawa.
Hahn, Paul, 433 Indian Road, Toronto.
Haight, D. H., Sudbury, Ont.
Halkett, A., Fisheries Museum, Ottawa.
Hanham, A. W., Duncans, B.C.
Harms, J. F., Treesbank, Man.
Harrington, W. H., P.O. Department, Ottawa.
Heath, E. F., Cartwright, Man.
Hewitt, Dr. C. Gordon, Experimental Farm, Ottawa.
Hudson, A. F., Millarville, Alta.
Jarvis, T. D., O. A. C., Guelph.
Keen, Rev. J. H., Metlakatla, B.C.
Leavitt, A. G., St. John, N.B.
Lyman, H. H., 74 McTavish Street, Montreal.
Marmont, L. E., 2553 Second Ave. West, Vancover, B.C.
McIntosh, W., St. John, N.B.
Metcalfe, W., 288 Bank Street, Ottawa.
Moore, G. A., 850 St. Hubert St., Montreal.
Moore, W. H., Scotch Lake, N.B.
Morris, Frank, Port Hope, Ont.
Nelles, Douglas H., Dept. Interior, Ottawa.
Nicholls, A., 18 Electric Street, Ottawa.
Perrin, Jos., McNab's Island, Halifax, N.S.
Rowland, Alton, Windsor Mills, Que.
Russell, John, Hope Station, B.C.
Sanders, G. E., Experimental Farm, Ottawa.
Sanson, N. B., Banff, Alta.
Saunders, Henry, 21 Harbord Street, Toronto.
Sherman, R. S., 2285 Sixth Avenue, Vancouver, B.C.
Simpson, W., Dominion Observatory, Ottawa.
Southee, G. R., Sherbrooke, Que.
Swaine, J. M., Macdonald College, Que.
Taylor, Rev. G. W., Departure Bay, B.C.
Tipping, E. Dalton, Minnehik P.O., via Bluff Centre, Alta.
Treherne, R. C., Grimsby, Ont.
Venables, E. P. Vernon, B.C.
Walker, Dr. E. M., Biological Dept., Univ. of Toronto.
Wallis, J. B., Machray School, Winnipeg, Man.
Willing, T. N., Saskatoon, Sask.
Winn, A. F., 32 Springfield Ave., Westmount, Que.
Young, C. H., Geological Survey, Ottawa.
Zavitz, E. J., O. A. C., Quelph, Ont.

NOTES OF CAPTURES.

LEPIDOPTERA.

(Arranged according to Dyar's List of North American Lepidoptera, U.S. N.M. Bull. No. 52).

(Dyar's number).

14. *Papilio thoas* L. Toronto, a fine specimen seen at the corner of Queen and Yonge Streets, July 2, (Crew).

64. *Eurymus boothii* Curtis. Dawson, Y.T., 1908, (A. Day).
95. *Speyeria idalia* Dru. Toronto, end August, (J. R. McMurrich). First record for this district.
131. *Brenthis myrina* Cram. A remarkable melanic specimen of this common butterfly was taken at Hull, Que., Aug. 8, by Dr. Fyles. The forewings are almost entirely suffused with black, very little red.
185. *Charidryas nycteis* D. & H. East Toronto, near Golf Links, August, (J. R. McMurrich.) This is another remarkable aberration in which the central large band across the wings is entirely white, not yellow as is usual.
282. *Coenonympha kodiak* Edw. a. *yukonensis* Holland. Dawson, Y.T., 1908, (A. Day).
284. *Coenonympha typhon* Rott. a. *laidon* Bork. Belleville, Ont. (Miss M. C. Melburn).
289 *Œneis macounii* Edw. Hymers, Ont., June 9, (Dawson).
295. *Œneis norna* Thunb. f. *taygete* Hbn. Dawson, Y.T., 1908, (A. Day).
378. *Incisalia niphon* Hbn. Hudson, Que., May 5, (Winn).
419 *Nomiades couperii* Grt. Sherbrooke, Que., June 4, (Southee).
430. *Rusticus shasta* Edw. Lethbridge, Alta., July 5, (Wallis).
440g *Cyaniris ladon* Cram. g. *piasus* Bdv. Bird's Hill, Winnipeg, Man., June 5, (Wallis).
656a. *Hemaris ruficaudis* Kirby. Edmonton, at sallow blossoms, May 13, (Carr), new to Alberta. I have the same form from Field, B.C., and from Chicago, and it is the *thysbe* of Holland's figure, with the marginal band even instead of dentate, and seems to be the *ruficaudis* of Smith's Monograph, (Dod).
657. *Lepisesia flavofasciata* Wlk. Sudbury, Ont., June 7, (Haight).
699. *Phlegethontius convolvuli* L. a. *cingulata* Fab. Ottawa, no date, (Bro. Germain). First record for the district.
713. *Sphinx canadensis* Bdv. Britannia, near Ottawa, July 19, (Groh).
741. *Samia columbia* Smith. Dryden, Ont., June 6, (McNicol & Pitt).
778. *Eacles imperialis* Dru. In addition to the captures recorded in the Ottawa Naturalist, Aug. 1910, 2 other specimens were collected at Ottawa, one on July 7, and the other at end of July, (W. Gibson). Mr. Grant also took 3 specimens at Orillia, Ont.
853. *Estigmene prima* Slosson. Several specimens of this rare moth were taken the past season in widely different localities: Shawbridge, Que., June 4, (Winn); Ottawa, (Nicholls); Sudbury, Ont., June 16, (Haight); Winnipeg, Man., June 2, (Wallis).
867. *Neoarctia brucei* Hy Edw. Mt. Cheam, B.C., Aug. 12, 1907, (Bush). First Canadian record that I know of.
876. *Apantesis michabo* Grt. Aweme, Man., May 27, (Criddle); var. *minea*, Hymers, Ont., June 7, (Dawson).
911. *Euchaetias oregonensis* Stretch. Ottawa, no date, (Nicholls), first record for district; Maynooth, Ont., June 18, rare in my experience, (Evans).
958. *Panthea portlandia* Grt. Banff, Alta., June 1, (Sanson). A Banff male, dated July 16, is in Prof. Smith's collection. Both are rather dark. New to Alberta, (Dod).
960. *Panthea acronyctoides* Wlk. Montreal, May 21, (Winn).
964. *Charadra deridens* Gn. Aweme, Man. June 28, (Criddle; Winnipeg, June 17, (Wallis). Rare in Manitoba.

Apatela cyanescens Hamp. Cowichan Lake District, B.C., 1 specimen, June 22, 1908, (Day).

974. *Apatela hesperida* Sm. Aweme, Man., June 28, Criddle).
992. *Apatela lætifica* Sm. Winnipeg, Man., June 17, (Wallis).
1001. *Apatela spinigera* Gn. Winnipeg, Man., June 17, (Wallis).
1005. *Apatela lithospila* Grt. Worthington, Ont., near Sudbury, July 6, (Haight).
1008. *Apatela funeralis* Grt. Ottawa, June 14, (Nicholls).
1010. *Apatela minella* Dyar. Winnipeg, June 15, (Wallis).
1097. *Platyperigea præacuta* Sm. Duncans, B.C., July 15, not previously recorded from Vancouver Island, (Hanham).
1101. *Caradrina meralis* Morr. Duncans, B.C., Aug. 25, not previously recorded from Vancouver Island, (Hanham); Trenton, Ont., Sept. 2, (Evans).
1109. *Caradrina miranda* Grt. Victoria, B.C., July 5, not previously recorded from Vancouver Island, (Hanham).
1149. *Hadena bridghami* G. & R. Rimouski Wharf, Que., Aug., (Gibb).
1189. *Hadena barnesii* Sm. Banff, Alta., July 30 to Aug. 4, not rare, (Sanson). This is the species so standing in my Alberta list. It seems almost, but not quite, to connect with *sora*.. Typical *barnesii* from Colorado is smaller and brighter coloured than either, (Dod).
1199. *Hadena versuta* Sm. Hymers, Ont., June 20-28, (Dawson).
1202. *Hadena miseloides* Gn. Winnipeg, June 17, (Wallis).
1210. *Hadena niveivenosa* Grt. Hymers, Ont., Aug. 7, 1909, (Dawson).
1221. *Hadena apamiformis* Gn. Winnipeg Beach, Man., July 5, (Wallis); Hymers, Ont., July 7, (Dawson).
1217. *Hadena remissa* Hbn. Duncans, B.C., May 23, not previously recorded from Vancouver Island, (Hanham).
1223. *Hadena morna* Strk. Duncans, B.C., Aug. 2, a rare species, (Hanham). The record of this species from High River in the Record for 1909 is wrong. The name was probably given by me, as the species stands as *morna* in Hampson's Catalogue, though erroneously. It is the *Orthosia conradi* Grt. of the Alberta List, and is either a local race or close ally of that species. Prof. Smith has described it as new under the name of *Agroperina lineosa* in Jour. N. Y. Ent. Soc., xviii, 145, Sept., 1910, (Dod).
1226. *Hadena cogitata* Sm. McNab's Island, near Halifax, N.S., June 30, (Perrin).
Hadena enigra Sm. Winnipeg, June 24, (Wallis).
Hadena multicolor Dyar. Duncans, B.C., June 2-29, (Hanham).
Hadena bonilla Barnes. Metlakatla, B.C., Aug. 6, 1904, (Keen).
Hadena sora Sm. Banff, Alta., July 16 to 22, three specimens, (Sanson).
1259. *Polia epichysis* Grt. Victoria, B.C., Aug. 24, not previously recorded from Vancouver Island, (Hanham).
Trachea jocasta Sm. Cartwright, Man., Sept 5, (Heath).
1356. *Oncocnemis barnesii* Sm. Banff, Alta., one worn female, Oct., 17, (Sanson). It agrees pretty closely with the description and with Hampson's figure, copied from a figure of the type from Yellowstone Park. The specimen is unlike any other species known to me, and a most interesting new Alberta record, (Dod).
1393. *Rhynchagrotis anchocelioides* Gn. Duncans, B.C., 1 sp. bred, July 5, not previously recorded from Vancouver Island, (Hanham).
1405a. *Rhynchagrotis formalis* Grt. a. *falcula* Grt. Winnipeg, Aug. 31, a surprising capture, (Wallis).

1421. *Platagrotis imperita* Hbn. Banff, Alta., 4 specimens, July 30 to Aug. 4, (Sanson); Calgary, Alta., July 23, 1908; Didsbury, Alta., Aug. 5, 8, 1905, (C. G. Garrett). I have a Labrador specimen from Prof. Smith's collection, and a B.C. specimen, probably from the Okanagan, is in the British Museum. It appears to be the *imperita* of Hampson's Catalogue. First Alberta records, (Dod).

1426. *Semiophora elimata* Gn. Banff, Alta., July 25, (Sanson). New to Alberta.

1449. *Setagrotis vernilis* Grt. Banff, Alta., July 30, (Sanson). A very dark specimen, but I think this species. New to Alberta, (Dod).

Setagrotis filiis Sm. (Trans. Amer. Ent. Soc. xxxiii, 125, April, 1907). Banff, Alta., Sept 1. The type is from Pullman, Wash.; a female from Laggan, Alta., Aug. 9, is in Prof. Smith's collection. I do not feel sure that it is not merely a very dark blue-grey form of *infimatis.* A new Alberta record, at any rate, (Dod).

1486. *Noctua oblata* Morr. Barrington Passage, N.S., July 5, (Young).

1544. *Feltia gladiaria* Morr. Trenton, Ont., Sept. 13, second specimen taken, (Evans).

1581. *Paragrotis olivalis* Grt. Duncans, B.C., rare, 1 at sugar, Aug. 15, and another at rest, Sept. 5, (Hanham).

1588. *Paragrotis brocha* Morr. Duncans, B.C., at sugar Sept. 15, 1908, not taken since, (Hanham).

1623. *Paragrotis personata* Morr. Rounthwaite, Man., (Marmont); Aweme, Man., July 13, 1904; Aug. 25, 1905 (Fletcher). See Ottawa Naturalist, Sept. 1910.

1639. *Paragrotis vallus* Sm. Banff, Alta., Sept. 8, (Sanson). The type is a female from Laggan. I have a female taken at Millarville on Oct. 5, 1907, which I had believed to be the female of *vulpina,* of which I have seen males only. Mr. Sanson's specimen is a male, and indicates a distinct species from *vulpina,* (Dod).

1682. *Paragrotis fuscigera* Grt. The species referred to by me under this name in the Record for 1909, turns out to be *pestula* Smith, which is an ally of *pleuritica* Grt. and distinct from *focinus* Smith, to which I have referred it, (Dod).

1692. *Paragrotis intrita* Morr. Winnipeg Beach, Man., Aug. 19-24, four specimens, (Wallis). Smaller only than Vancouver Island specimens of which I have a long series. I believe *strigilis* Grote, *titubatis* Smith and *reuda* Strecker, to be variations of *intrita,* and have specimens compared with all the types except *reuda,* which I overlooked. The "*intrita*" of my Alberta list is another species, and so have been all previous Manitoba records of any of the above names that I have been able to investigate, (Dod).

Paragrotis esta Sm. Duncans, B.C., Aug. 16, 1907, (Day).

1693. *Paragrotis mollis* Walk. Millarville, July 5, (Dod).

1703. *Paragrotis basiflava* Sm. Banff, Alta., Aug. 19, (Sanson). This was described from "N. W. B. C." *Compressipennis* was described from Yosemite, B.C., The types are identical, (Dod).

1734. *Paragrotis colata* Grt. Banff, Alta., July 22, (Sanson). Mrs. Nicholl took a specimen at 8,000 feet, on Wilcox Peak, near the head waters of the Saskatchewan, which is in the British Museum, and which I have compared with the type there from Mt. Hood, Oregon. The species resembles a dark *mollis.* (Dod).

1745. *Paragrotis silens* Grt. Rimouski Wharf, Que., Aug., a new locality, (Gibb).

1773. *Mamestra nimbosa* Gn. Duncans, B.C., at sugar, middle July, rare here, (Hanham).

1792. *Mamestra atlantica* Grt. This species does not appear to be included in our British Columbia list; I have one specimen labelled Victoria, (Hanham).

1805. *Mamestra congermana* Morr. McNab's Island, near Halifax, N.S., July 28, (Perrin); Winnipeg, June 15, 17; 2 females, (Wallis). Holland's figure under this name is *artesta* Smith. Sir George Hampson places them in different genera upon characters which are well marked, (Dod).

1806. *Mamestra rubefacta* Morr. McNab's Island, N.S., June 3, (Perrin); Winnipeg Beach, June 17, (Wallis).

1809. *Mamestra pulverulenta* Sm. Banff, Alta., (Sanson). *Pulverulenta* was described without locality, as a variety of *assimilis* Morr., and the Banff specimen agrees with the description, though I have seen the type of neither form. The "*assimilis*" of the Kaslo list is the same species. *Assimilis* is a black species common at Calgary, and I have seen it from Banff also. *Pulverulenta* is dark fuscous, powdery. I am under the impression that they are two species, (Dod).

1813. *Mamestra variolata* Sm. Victoria, B.C., July 15, only record, (Hanham).

1840. *Mamestra sutrina* Grt. Duncans, B.C., 2 at sugar, June 8, 12, a rare species in B.C., (Hanham).

1876. *Mamestra negussa* Sm. Winnipeg, Man., May 30, (Wallis).
Mamestra acutermina. Winnipeg, July 13, (Wallis).

1882. *Barathra curialis* Sm. Edmonton, June 17. New to Alberta, (Carr teste Dod).

2048. *Stretchia plusiiformis* Hy Edw. Hymers, Ont., May 15, (Dawson). First Ontario record.

2070. *Cleoceris rectifascia* Sm. Duncans, B.C., July 18, (Hanham).
Pleroma conserta Grt. Banff, Alta., April 25, and May 7, (Sanson). The type is from the State of Washington and is largely suffused with black. That of *apposita* Smith is from Victoria, B.C., and is similarly suffused. Sir George Hampson treats them as the same species, I think correctly. Mr. Sanson also took a form without the black suffusion, which I believe to be the same species, (Dod).
Pleroma cinerea Sm. Duncans, B.C., late Oct., (Hanham).

2086. *Xylina hemina* Grt. Hymers, Ont., Sept. 4, (Dawson).
Cucullia indicta Sm. Millarville, Alta., June 5 and 11, (Dod).

2148. *Bellura diffusa* Grt. Barrington Passage, N.S., July 12, (Young).

2171. *Papaipema cerina* Grt. Winnipeg, Sept. 15, (Wallis).

2190.1. *Papaipema insulidens* Bird. Duncans, B.C., at light, Aug. 21, 1908, (Day).

2199. *Xanthia flavago* Fab. Waswanipi River, Hudson Bay Slope, Aug. 1896, (Dr. R. Bell).

2210. *Pseudoglaa blanda* Grt. Duncans, B.C., Sept. 18, 1907, (Day).

2244. *Scopelosoma devia* Grt. Duncans, B.C., 1 specimen at sallow, March 26; *tristigmata* is, I believe, the only species previously recorded from British Columbia, (Hanham).

2280. *Pippona bimatris* Harv. Treesbank, Man., July 20. (Wallis).

2341. *Schinia acutilinea* Grt. Calgary, Alta., town lights, Aug. 8, (Hudson). Agrees with Hampson's figure of type from Colorado, and is like my specimens from Glenwood Springs. Apparently a new record for Canada, (Dod).

Autographa V-alba Ottol. Banff, Alta., Aug. 19, (Sanson). The specimen is a female and agrees with Ottolengui's figure of the type in all except the sign, which is more like the sign in his figure of *surena,* though not nearly as wide. It can be no other known species than *V-alba,* and the sign probably varies to that extent, (Dod).

2509. *Autographa selecta* Wlk. Banff, Alta., Aug. 4 to 19, (Sanson). Walker's type has the subterminal line waved, rather than dentate, as in Grote's type of *viridisignata.* Autographas do not usually vary that way, and the character may prove to be of specific value. *Viridisignata* is the common form, though the sign is not always green. Mr. Sanson has both forms. The first Alberta records, (Dod).

2514. *Autographa celsa* Hy. Edw. Ucluelet, B.C., Aug. 20, 1909, (Young).

2526. *Autographa speciosa* Ottol. Duncans, B.C., July 12, 1907, (Day).

Autographa sansoni Dod. Banff, Alta., June 10, (Sanson).

2548. *Pœctes oculatrix* Gn. Winnipeg, June 15, (Wallis).

2784. *Syneda alleni* Grt. Orillia, Ont., (Grant).

2819. *Catocala obscura* Strk. Ottawa, (Nicholls). First record for district.

2858. *Catocala coccinata* Grt. "E. Ont., Can.," (Evans).

2871. *Catocala subnata* Grt. Belleville, Ont., (Evans).

2886. *Catocala cœlebs* Grt. Belleville, Ont., (Evans).

2890. *Catocala whitneyi* Dodge. Stony Mt., Man., Aug. 11, (Chaplin & Wallis).

Catocala caerulea Beut. Penticton, B.C., Aug. 11, 1909, (Wallis). First record for Canada, hitherto known from Oregon.

3125. *Symmerista albifrons* S. & A. Montreal West; moths in great abundance on tree trunks, June 19, not a trace of larvæ in August. (Winn).

3165. *Fentonia marthesia* Cram. Orillia, Ont., (Grant).

3176. *Pseudothyatira cymatophoroides* Gn. Edmonton, July 1, (Carr). New to Alberta, (Dod).

3180. *Euthyatira pudens* Gn. Winnipeg, May 20, (Wallis).

3226. *Oreta rosea* Wlk. Montreal, Aug. 19, taken at rest in city. First time I have taken it here, (Winn).

3227. *Oreta irrorata* Pack. Rimouski Wharf, Que., (Gibb).

Tephroclystis russeliata Swett. St. Fabien, Rimouski Co., Que., July, (Chagnon).

3455. *Petrophora algidata* Mosh. Westbourne, Man., July 30, 1908, (Wallis).

3476. *Mycterophora slossoniæ* Hulst. Winnipeg, Man., July 23, 1908, (Wallis). In identifying this specimen Mr. Grossbeck reports: "Dr. Dyar says this is a noctuid, and apparently he is correct."

3545. *Eois persimilis* Hulst. Winnipeg, Man., June 27, 1908, (Wallis). A rare species.

3657. *Sciagraphia hebitata* Hulst. Banff Alta. June 23, 1909, (Wallis).

3693. *Cymatophora flavicaria* Pack. Yukon, collected on wagon road, between White Horse and Dawson, (R. Stewart).

3876. *Apocheima rachelæ* Hulst. High River, Alta., March 12, (Baird).

Cingilia rubiferaria Swett. Montreal, Sept. 28, 1905, (Chagnon).

3902. *Sicya macularia* Harr. "Nordenskiold", Yukon Territory, Aug. 21, 1908, (R. Stewart).

3963. *Euchlæna astylusaria* Walk. Millarville, Alta., May 31, (Dod).
3991. *Priocycla decoloraria* Hulst. St. John's, Que., July 1, 1906, (Chagnon).
4095. *Cochlidion rectilinea* G. & R. Trenton, Ont., July 12, (Evans).
4142. *Cossus centerensis* Lint. Hymers, Ont., June 27, (Dawson)
4148. *Prionoxystus macmurtrei* G. M. Port Hope, Ont., June 21, 1896, (Metcalfe).
4210. *Sesia morula* Hy. Edw. Aweme, Man., 2 specimens, July 20, 21, (Criddle). Apparently the first Canadian record.
4622. *Argyria auratella* Clem. St. John's, Que., July 12, (Chagnon).
4658. *Tetralopha militella* Zell. Rigaud, Que., July 28, (Chagnon).
4693. *Acrobasis betulella* Hulst. Mt. St. Hilaire, Que., July 1, (Chagnon).
4694. *Acrobasis comptoniella* Hulst. Mt. St. Hilaire, Que., July 1, (Chagnon).
4711. *Dioryctria abietella* D. & S. Montreal, July 25, (Chagnon).
4723. *Glyptocera consobrinella* Zell. Mt. St. Hilaire, Que., June 27, (Chagnon).
4734. *Nephopteryx ovalis* Pack. Mt. St. Hilaire, Que., July 2, (Chagnon).
4746. *Meroptera pravella* Grt. Mt. St. Hilaire, Que., July 5, (Chagnon).
4748. *Meroptera unicolorella* Hulst. Mt. St. Hilaire, Que., June 27, (Chagnon).
4759. *Salebria contatella* Grt. St. John's Que., July 1, (Chagnon).
4776. *Laodamia fusca* Haw. Mt. St. Hilaire, Que., Sept. 1, (Chagnon).
4843. *Canarsia ulmiarrosorella* Clem. Mt. St. Hilaire, Que., July 6, (Chagnon).
4870. *Homœosoma stypicellum* Grt. Mt. St. Hilaire, Que., July 6, (Chagnon).
4939. *Platyptilia acanthodactyla* Hbn. Trenton, Ont., Sept 13, 1908, (Evans).
5049. *Olethreutes duplex* Walsm. Ottawa, leaf roller on poplar, May, 1908, (Gibson).
5131. *Eucosma nisella* Clerck. Trenton, Ont., Aug. 26, 1908, (Evans).
5207. *Episimus argutanus* Clem. Trenton, June 13, (Evans).
Proteoteras crescentana Kearf. Winnipeg, Man., (Wallis); Regina, Sask., July, (Willing). Larvæ probably in stem galls on box elder, (W. D. K.).
5261. *Ancylis goodelliana* Fern. Trenton, July 25, 1908, (Evans).
5287. *Ecdytolopha insiticiana* Zell. Trenton, June 18, Aug. 14, (Evans).
Sparganothis tristriata Kearf. Ottawa, June 27, 1908, (Gibson). A rare species.
5371. *Archips fractivittana* Clem. Chelsea, Que., emerged June 10, 1908, (Gibson); Montreal, June, (Chagnon).
Tortrix alleni Fern. Trenton, 3 dates, July 1-July 6, (Evans).
5419. *Eulia quadrifasciana* Fern. Trenton, 4 dates, June 25-July 17, (Evans).
5452. *Phalonia bunteana* Rob. Trenton, July 4, (Evans).
Hysterosia baracana Busck. Trenton, July 11, (Evans).
5504. *Plutella porrectella* L. Trenton, June 14, 1904, (Evans).
5579. *Aristotelia fungivorella* Clem. Trenton, June 28, (Evans).
5595. *Eucordylea atrupictella* Dietz. Trenton, July 18, (Evans).
5655. *Trichotaphe flavocostella* Clem. Trenton, July 4, (Evans).
5769. *Gelechia rileyella* Chamb. Trenton, (Evans).
5870. *Depressaria nebulosa* Zell. Sudbury, Ont., (Evans).
6010. *Coleophora spissicornis* Haw. Trenton, 13 dates, June 20-Sept. 24, (Evans).
6048. *Coleophora tiliæfoliella* Clem. Ottawa, case on basswood, Sept. 24, (Gibson).
6096. *Lymnœcia phragmitiella* Stainton. Trenton, 2 specimens, July 14, 1906, July 16, 1907, (Evans).
Mompha stillella Busck. Trenton, Sept. 19, 1906, (Evans).

6282. *Lithocolletes sexnotella* Chamb. Trenton, 5 specimens, June 13-July 9, 1908, (Evans).
6306. *Lithocolletes guttifinitella* Clem. Halifax, N.S., Sept., larvæ mining the upper surface of *Rhus toxicodendron,* (A. H. Mackay).
Lithocolletes hamameliella Busck. Halifax, N.S., Sept., larvæ mining leaves of *Hamamelis virginica,* (A. H. Mackay).
6496. *Tinea bimaculella* Chamb. Trenton, June 20, (Evans).
6497. *Tinea canariella* Clem. Trenton, July 2, (Evans).
6534. *Amadrya effrenatella* Clem. Trenton, July 29, (Evans).
6537. *Diachorisia velatella* Clem. Trenton, July 22, (Evans).
6606. *Sthenopis thule* Strk. Ottawa, at light, (Nicholls). Second specimen taken in this district.
6609. *Hepialus mustelinus* Pack. Hymers, Ont., July 7, (Dawson).

Coleoptera.

(Arranged according to Henshaw's List of the Coleoptera of America, North of Mexico).

178. *Notiophilus sibiricus* Mots. Vicinity of Stewart River, Y. T., (Nelles).
411. *Bembidium acutifrons* Lec. Winnipeg, Man., May 14, 1909, (Wallis).
413. *Bembidium cautum* Lec. Winnipeg, Man., May 14, 1909, (Wallis).
558. *Pterostichus scitulus* Lec. Lethbridge, Alta., July 5, 1909, (Wallis).
564. *Pterostichus sayi* Brulle. Deseronto, Ont., Sept. 25, 1 specimen, the only one I have ever taken, (Evans).
587. *Pterostichus patruelis* Dej. Vicinity of Stewart River, Y.T., (Nelles).
636. *Amara brunnipennis* Dej. Fullerton, Hudson Bay, July 5, 1904, (Halkett).
813. *Platynus perforatus* Lec. Vicinity of Stewart River, Y.T., (Nelles).
1157. *Bradycellus cordicollis* Lec. Winnipeg, Man., May 14, (Wallis).
1225. *Haliplus cribrarius* Lec. Winnipeg Beach, Man., Sept. 6, (Wallis).
1226. *Haliplus ruficollis* DeG. Winnipeg Beach, Man., June 12; Peachland, B. C., July 28, 1909, (Wallis).
1227. *Haliplus longulus* DeG. Winnipeg, June 5, (Wallis).
1228. *Cnemidotus callosus* Lec. Peachland, B.C., Aug. 18, (Wallis).
1233. *Cnemidotus edentulus* Lec. Winnipeg Beach, Man., June 12, (Wallis).
1275. *Bidessus affinis* Say. Winnipeg, May 27, (Wallis).
1285. *Cœlambus punctatus* Say. Winnipeg Beach, Man., June 12; Peachland, July 31, (Wallis).
1289. *Cœlambus turbidus* Lec. Winnipeg, May 1, (Wallis).
1290. *Cœlambus lutescens* Lec. Winnipeg, April 13, (Wallis).
1293. *Cœlambus sellatus* Lec. Peachland, B.C., Aug. 18, (Wallis).
1297. *Cœlambus nubilus* Lec. Winnipeg, June 19, (Wallis).
1302. *Cœlambus impressopunctatus* Sch. Winnipeg, April 13, (Wallis.
1303. *Deronectes depressus* Fab. Winnipeg Beach, Man., June 12, (Wallis).
1306. *Deronectes striatellus* Lec. Peachland, B.C., July 27, (Wallis).
1320. *Hydroporus consimilis* Lec. Winnipeg Beach, June 12, (Wallis).
1338. *Hydroporus septentrionalis* Gyll. Peachland, B.C., July 27, (Wallis).
1340. *Hydroporus rivalis* Gyll. Peachland, B.C., July 27, (Wallis).
Hydroporus rusticus Sharp. Winnipeg, April 13, (Wallis). Mr. Roberts considers this to be a good species.
1352. *Hydroporus tristis* Payk. Winnipeg, May 1, (Wallis).

1354. *Hydroporus rufinasus* Mann. Winnipeg, May 8, (Wallis). A rare species.
1376. *Hydroporus oblongus* Steph. Winnipeg, April 13, (Wallis). I have never seen this species in any collection but my own, (C.H.R.).
1396. *Coptotomus interrogatus* Fab. Winnipeg Beach, Sept. 6, (Wallis).
1399. *Ilybiosoma bifarius* Kirby. Winnipeg, April 13, (Wallis).
1423. *Agabus semipunctatus* Kirby. Winnipeg, April 12, (Wallis).
Agabus æneolus Cr. Winnipeg, April 13, (Wallis).
1434. *Agabus subfuscatus* Sharp. Winnipeg, May 13, (Wallis).
1450. *Agabus clavatus* Lec. Winnipeg, May 1, (Wallis); Aweme, Man., (Criddle). A rare species.
1466. *Rhantus bistriatus* Bergst. Winnipeg, Sept. 11, (Wallis).
Graphoderes perplexus Sharp. Winnipeg Beach, Sept. 6, (Wallis); Aweme, Man., (Criddle). A rare species.
1508. *Gyrinus fraternus* Coup. Winnipeg Beach, June 12, (Wallis).
1519. *Gyrinus affinis* Aube. Winnipeg Beach, June 12, (Wallis).
1529. *Gyrinus picipes* Aube. Winnipeg Beach, June 12, (Wallis).
Athetá nimia Casey. Metlakatla, B.C., (Keen).
Athetá keeni Casey. Metlakatla, (Keen).
Athetá insolens Casey. Massett, Q.C.I., (Keen).
Athetá fanatica Casey. Massett, Q.C.I., (Keen).
Athetá massettensis Casey. Massett, Q.C.I., (Keen).
Dimetrota retrusa Casey. Metlakatla, B. C., (Keen).
Sabletá canadensis Casey. Toronto, Ont.
Sabletá phrenctica Casey. Metlakatla, B.C., (Keen).
Acrotona adjuvans Casey. Ottawa, Ont., (Harrington).
2114. *Quedius ferox* Lec. Trenton, Ont. Sept. 4, 1 specimen, never took it before, (Evans).
2301. *Dianous zephyrus Casey.* Vernon, B.C., (Venables).
2618. *Tachinus nigricornis* Mann. Victoria, B.C., July 17, (Wallis).
3052. *Hippodamia folcigera* Cr. Stewart River, Y.T., (Nelles).
3709. *Epuræa truncatella* Mann. Stewart River, Y.T., (Nelles).
3848. *Peltis pippingskoeldi* Mann. Penticton, B.C., Aug. 16, (Wallis).
4150. *Cryptohypnus bicolor* Esch. Roland, Man., May 24, (Wallis).
4382. *Pityobius anguinus* Lec. St. Andrew's, N.B., July 11, (Treherne and Sanders).
4503. *Asaphes morio* Lec. Victoria, B.C., July 17, (Wallis).
4594. *Pœcilonota cyanipes* Say. Stewart River, Y.T., (Nelles).
4602. *Buprestis consularis* Gory. Stewart River, Y.T., (Nelles).
4611. *Buprestis adjecta* Lec. Peachland, B.C., Aug. 23, (Wallis).
4629. *Anthaxia deleta* Lec. Peachland, B.C., July 23, (Wallis).
4948. *Telephorus curtisii* Kirby. Vicinity of Stewart River, Y.T., (Nelles).
5271. *Hadrobregmus carinatus* Say. Stewart River, Y.T., (Nelles).
5329. *Cœnocara scymnoides* Lec. Strassburg, Sask., June, 1907, from puff ball, (Willing).
5603. *Geotropes balyi* Jek. St. Paul's Island, Hudson Bay, Aug., 25, 1904, (Halkett).

Lachnosterna. Among 404 specimens of May beetles collected at Round Hill, N.S., by Miss E. Grace Sanders, from May 21 till June 15, only two species were represented, viz., *dubia* and *grandis.* The latter species was rare, only six being taken, three of these on *Cratægus.* The determinations were made by Mr. R. D. Glasgow, of the University of Illinois,

Urbana, Ill. Mr. Glasgow is making a special study of the Lachnosternidæ, and would be glad to examine and return Canadian material. No specimens should be pinned without having the genitalea extruded. It is important, too, that the specimens be collected in the evening, when they are feeding, and a note of the food plant taken.

5880. *Xyloryctes satyrus* Fab. Mt. St. Hilaire, Que., May 20, (Chagnon).
5924. *Cremastochilus crinitus* Lec. Peachland, B.C., July 25, (Wallis).
6240. *Toxotus vittiger* Rand. Pincher, Alta., July 10, 1904, (Willing).
6250. *Pachyta rugipennis* Newm. Hymers, Ont., June 6, (Dawson).
6253. *Anthophylax malachiticus* Hald. Twp. Sabine, Ont., 1 specimen, June 17; I took one other about 1875 at Madoc Village; a rare species, (Evans).
6260. *Acmœops atra* Lec. Pine Creek, Alta., July 12, 1903, (Willing).
6320. *Leptura tribalteata* Lec. Peachland, B.C., Aug. 2, (Wallis).
6349. *Leptura tibialis* Lec. Peachland, B.C., Aug. 7, (Wallis).
6445. *Acanthocinus obsoletus* Oliv. Vicinity of Stewart River, Y.T., (Nelles).
6487. *Saperda puncticollis* Say. Guelph, Ont., May 18, (Zavitz); Macdonald College, Que., (Swaine).
6532. *Donacia hirticollis* Kirby. Penticton, B.C., Aug. 11 (Wallis).
6782. *Prasacuris phellandrii* L. Victoria, B.C., July 17, (Wallis).
6904. *Galeruca tuberculatá* Say, var. *punctipennis* Mann. Goldstream, B.C., on alder, Aug. 12, (J. R. Anderson). Not heretofore recorded from Canada, so far as I am aware, except that Horn in his synopsis of the genus gives it as occurring on Vancouver Island, (Evans).
6968. *Haltica evictá* Lec. Halfway Lake, Alta., on turnips and cabbages, (F. Strutton); Vernon. B.C., (Venables).
Phylotreta armoricæ Kock. Montreal, June 20, (Winn).
7257. *Asida politá* Say. Swift Current, Sask., Aug. 1901, (Willing).
7666. *Serropalpus barbatus* Schall. Cupar, Sask., June 4, 1907. (Willing).
7704. *Mycterus concolor* Lec. Peachland, B.C., Aug. 7, (Wallis).
7704a. *Mycterus flavipennis* Horn. Peachland, B.C., Aug. 7, (Wallis).
7724. *Calopus angustus* Lec. Hymers, Ont., July 22, (Dawson).
8121. *Pomphopœa sayi* Lec. Shawbridge, Que., June 4, (Winn).
8221. *Rhynchites eyanellus* Lec. Quill Lake, Sask., on willow, June 30, 1907, (Willing).
8203. *Auletes subcræuleus* Lec. Vernon, B.C., (Venables).
Apion commodus Fall. Aweme, Man., (Criddle).
8543. *Erycus puncticollis* Lec. Cupar, Sask., under chips and bark, June 4, 1907, (Willing).
8760. *Acalles porosus* Lec. Lethbridge, Alta., July 5, (Willing).
8825. *Mononychus vulpeculus* Fab. Quyon, Que., (Fyles).
9320. *Creniphilus moratus* Horn. Vernon, B.C., (Venables).
11079. *Phytobius griseomicans* Sz. Last Mountain Lake, Sask., June 5, (G. C. McBean).

Diptera.

(Arranged according to a catalogue of North American Diptera, by J. M. Aldrich, Smithsonian Misc. Coll. XLVI, No. 1,144. The numbers refer to the pages in the catalogue).

During the past year Mr. D. W. Coquillett has determined collections of diptera made in 1908 and 1909 in Manitoba, Alberta and British Columbia, by Mr. J. B. Wallis, of Winnipeg. In these collections are many species of interest, some of which are new to the Canadian list.

97. *Pachyrhina altissima* O. S. Winnipeg, Man., Aug. 23, 1908, (Wallis).
97. *Pachyrhina erythrophrys* Will. Winnipeg, July 6, 1908, (Wallis).
98. *Pachyrhina ferruginea* Fab. Winnipeg, June 19, (Wallis).
112. *Chironomus cristatus* Fab. Winnipeg, May 5, 1908, (Wallis).
126. *Theobaldia incidens* Thom. Metlakatla, B.C., emerged 1-6 Aug., (Keen).
140. *Sciophila flavohirta* Coq. Winnipeg, June 22, 1908, (Wallis).
144. *Neoglaphyroptera cincta* Coq. Winnipeg, June 22, 1908, (Wallis).
164. *Plecia heteroptera* Say. Winnipeg, Sept. 16, 1908, (Wallis).
172. *Rhyphus alternatus* Say. Treesbank, Man., June, 1908, (Wallis).
174. *Actina viridis* Say. Winnipeg, June 24, 1908, (Wallis).
200. *Tabanus affinis* Kirby. Peachland, B.C., Aug. 7, 1909, (Wallis).
200. *Tabanus ægrotus* O. S. Penticton, B.C., Aug., 1908, (Miss B. Farmer); Peachland, B.C., Aug 18, 1909, (Wallis).
217. *Atherix variegata* Walk. Winnipeg, June 19, 1908, (Wallis).
219. *Pterodontia flavipes* Gray. Callander, Ont., July 19, 1909, (H. A. Wenzel).
225. *Exoprosopa decora* Loew. Lethbridge, Alta., July 9, 1909; Westbourne, Man., Aug. 24, (Wallis).
225. *Exoprosopa caliptera* Say. Lethbridge, Alta., July 7, 1909; Westbourne, Man., Aug. 14, (Wallis).
227. *Dipalta serpentina* O. S. Peachland, B.C., July 31, 1909, (Wallis).
228. *Anthrax alternata* Say. Peachland, B.C., Aug. 6, 1909, (Wallis).
299. *Anthrax catulina* Coq. Peachland, B.C., July 21, 1909, (Wallis).
230. *Anthrax eumenes* O. S. Lethbridge, Alta., July 3, 1909; Victoria, B.C., July 15, 1909, (Wallis).
230. *Anthrax fulviana* Say. Westbourne, Man., Aug. 16, 1908, (Wallis).
232. *Anthrax lucifer* Fab. Winnipeg, Aug. 8, 1908; Westbourne, July 27, 1908, (Wallis).
233. *Anthrax mucorea* Loew. Lethbridge, Alta., July 7, 1909.
234. *Anthrax sinuosa* Wied. Westbourne, Man., Aug., 19, 26, 1908; Lethbridge, Alta, July 9, 1909; Peachland, B.C., July 21, Aug 18, 1909, (Wallis).
234. *Anthrax tegminipennis* Say. Winnipeg, July 21, 1908, (Wallis).
237. *Systœchus candidulus* Loew. Winnipeg, July 21, 1908, (Wallis).
247. *Psilocephala hæmorrhoidalis* Macq. Peachland, B.C., July 29, 1909, (Wallis).
256. *Stenopogon inquinatus* Loew. Peachland, B.C., Aug. 3, 1909, (Wallis).
259. *Cyrtopogon dasyllis* Will. Kaslo, B.C., Sept. 1, 1907, (Cockle).
259. *Cyrtopogon dasylloides* Will. Kaslo, B.C., Sept. 1, (Cockle).
260. *Cyrtopogon præpes* Will. Banff, Alta., (Sanson).
260. *Cyrtopogon rejectus* O. S. Peachland, B.C., July 24, 1909, (Wallis).
269. *Pogonosoma dorsatum* Say. Victoria, B.C., July 1908, (Miss B. Farmer).
272. *Laphria canis* Will. Ottawa, Sept. 1, (Hewitt).
274. *Proctacanthus milbertii* Macq. Peachland, B.C., Aug. 21, 1909, (Wallis).
276. *Erax aridus* Will. Peachland, B.C., Aug. 7, 1909, (Wallis).
281. *Tolmerus callidus* Will. Lethbridge, Alta., July 3, 1909, (Wallis).
283. *Asilus paropus* Walk. Westbourne, Man., Aug. 20, 1908, (Wallis).
300. *Dolichopus brevimanus* Loew. Winnipeg, Man., June 19, 1908, (Wallis).
349. *Pipiza albipilosa* Will. Kaslo, B.C., July 14, 1908, (Cockle).
360. *Melanostoma cœrulescens* Will. Kaslo, B.C., April 12, July 10, (Cockle).
Syrphus perplexus Osburn. Kaslo, B.C., July 14, 1908, (Cockle).
368. *Syrphus umbellatarum* Fab. Kaslo, B.C., Oct. 11, 1909, (Cockle).
368. *Allograpta fracta* O.S. Winnipeg, Man., June 29, 1908, (Wallis).

375. *Rhingia nasica* Say. Winnipeg, Man., June 19, 1908, (Wallis).
375. *Hammerschmidtia ferruginea* Fallen. Winnipeg, June 19, 1908, (Wallis).
387. *Eristalis occidentalis* Will. Victoria, B.C., July 17, 1909, (Wallis).
401. *Brachypalpus pulcher* Will. Kaslo, B.C., July 21, 1907, (Cockle).
402. *Criorhina kincaidi* Coq. Kaslo, B.C., May 2, 1904, (Cockle).
408. *Physocephala burgessi* Will. Victoria, B.C., July 17, 1909, (Wallis).
456. *Exorista cheloniæ* Rond. Reared at Ottawa from larva of *Phragmatobia assimilans*, var. *franconia*, from Mr. H. Dawson, of Hymers, Ont., (Gibson).
464. *Frontina setipes* Coq. Aweme, Man., April 21, 1908, (Wallis).
582. *Palloptera jucunda* Loew. Kaslo, B.C., Oct. 27, 1906, (Cockle).
590. *Tritoxa cuneata* Loew. Lethbridge, Alta., July 4, 1909, (Wallis).
615. *Micropeza producta* Walk. Winnipeg, Man., July 6, 1908, (Wallis).
638. *Oscinis decipiens* Loew. Kaslo, B.C., Sept. 1, 1907 (Cockle).

Hymenoptera.

In the Entomological Records for 1907 and 1908, records are given of some Bombi. Since, Dr. H. J. Franklin has determined further material for Canadian collectors, and among these the following species may well be recorded here:

Bombus flavifrons Cresson. Metlakatla, B.C., May, (Keen).
Bombus melanopygus Mylander. Metlakatla, B.C., May, (Keen).
Bombus huntii Greene. Regina, Sask., Sept 17, Oct 3, (Willing).
Bombus terricola Kirby. Hampton, P.E.I., Aug 20, 1909, (Gibson).
Bombus rufocinctus Cresson. Gull Lake, Alta., Aug. 30, 1908 (Halkett).
Psithyrus ashtoni Cresson. Hampton, P.E.I., Aug. 20, 1909, (Gibson).
Psithyrus laboriosus Fab. Hampton. P.E.I., Aug. 20, 1909. (Gibson).

Prof. T. D. A. Cockerell, one of the leading authorities on North American bees very kindly named a small collection from the Northwest. Some of these are extremely interesting and new to Canada. The following may be mentioned:

Melissodes confusa Cr. Meota, Sask., July 8, 1906; Prince Albert, Sask., July 28, 1907; Radisson, Sask., July 29, 1907; Macleod, Alta., July 8, 1904, (Willing).

Osmia novomexicana Ckll. Medicine Hat, Alta., May 30, 1904, (Willing).

Halictoides maurus Cr. Kinistino, Sask., July 26, 1907, (Willing).

Anthidium tenuifloræ Ckll. Radisson, Sask., July 29, 1907; Saskatoon, Sask., July 18, (Willing).

Megachile calogaster Ckll. Macleod, Alta., July 2, 1904, (Willing).
Megachile infragilis Cr. Regina, Sask., July 11, 1909, (Willing).
Megachile manifesta Cr. Davidson, Sask., Aug. 21, 1907. (Willing).
Megachile pugnata Say. Radisson, Sask., July 29, (Willing).
Cœlioxys ribis Ckll. Prince Albert, Sask., July 27, 1907, (Willing).
Andrena cockerelli Graen. Lipton, Sask., June 5, 1907, (Willing).
Halictus trizonatus Cr. Mortlach, Sask., May 31, 1909, (Willing).
Halictus lerouxii ruborum Ckll. Mortlach, Sask., May 31, 1909, (Willing).
Agapostemon texanus Cr. Mortlach, Sask., May 31, 1909, (Willing).
Colletes salicicola geranii Ckll. Pincher, Alta., July 10, 1904, (Willing).

Coleocentrus pettitii Cr. Hymers, Ont., June 22, (Dawson).

Arotes amoenus Cr. Hymers, Ont., June 21, (Dawson).

Xylonomus stigmapterus Say. Hymers, Ont., (Dawson).

Echthrus niger Cr. Hymers, Ont., June 9, (Dawson).

Echthrus rufopedibus Harrington. Hymers, Ont., June 26, (Dawson).

Telenomus dalmanii (Ratz) Mayr. Reared in Division of Entomology, Ottawa, from eggs of *Notolophus antiqua,* from Little Bras d'Or, Cape Breton, N. S. Mr. Crawford, who determined the species says: "It is a European species recorded there from the same host, but not previously recorded from America."

Pachycrepoideus dubius Ashm. Reared in Division of Entomology, Ottawa, from breeding jar containing puparia of Cabbage Root Maggot; emerged Aug 14.

Nasonia tortricis Brues. Baskatong, Que., emerged from pupæ of *Tortrix fumiferana,* Aug. 1909, (Gibson).

Mematus pinguidorsum Dyar. Ottawa, larva Sept. 16, (Gibson).

Pteronus ochreatus Rohwer. St. John, N.B., July 14, (Leavitt).

Pontania pumila Rohwer. St. John, N.B., July 14; Nerepis, N.B., July 22, (Leavitt).

Pontania leavitti Rohwer. Nerepis, N.B., July 11, (Leavitt).

Pristiphora idiotiformis Rohwer. Nerepis, N.B., Aug. 18; St. John, N.B., Sept. 1, (Leavitt).

Pristiphora pallicoxa Rohwer. Nerepis, N.B., July 22, (Leavitt).

Cryptocampus pallistigmus Rohwer. St. John, N.B., July 18, (Leavitt).

Polybates secundus Rohwer. St. John, N.B., Sept. 1, (Leavitt).

Parabates leucostomus Rohwer. St. John, N,B., July 11, (Leavitt).

Hemitaxonus rufopectus Rohwer. Nerepis, N.B., Aug. 22, (Leavitt).

Monsoma maura Rohwer. Nerepis, N.B., July 18; St. Johns Bay, N.B., July 14, (Leavitt).

Dimorphopteryx melanognathus Rohwer. Nerepis, N.B., July 22, (Leavitt).

Tenthredo diversiceps Rohwer. Nerepis, N.B., July 22, (Leavitt).

Hemiptera.

Little systematic work has been done in this order, as far as the writer knows, in Canada, during 1910. Small collections of material gathered in other years have been worked over by Mr. Van Duzee, and of these the following species are of interest. They are entered here in the order in which they were received.

Apiomerus ventralis Say. Lethbridge, Alta., July 3, 1909, (Wallis).

Aradus inornatus Uhler. Peachland, B.C., Aug. 17, 1909, (Wallis).

Aradus robustus Uhler. "North West Territories," (record sent by Mr. Evans).

Lygus viticollis Reut. Winnipeg, Man., June 29, 1908, (Wallis).

Corythuca arcuata Say. Chelsea, Que., June 20, (Groh).

Alydus conspersus Mont. Aylmer, Que., (Fyles).

Megalotomus quinquespinosus Say. Aylmer, Que., (Fyles).

Podisus placidus Uhler. Co. Hastings, Ont., (Evans).

Podisus sereiventris Uhler. Co. Hastings, Ont., Aug. 15, 1906, (Evans).

Peribalus piceus Dallas. Sudbury, Ont., June 13, 1889, (Evans).

Crophius bohemani Stal. "North West Territories," (record sent by Mr. Evans).

Peritrechus fraternus Uhler. Belleville, Ont., (Evans).

Pilophorus walshii Uhler. Belleville, Ont., (Evans).

Plinthisus americanus Van D. Belleville, Ont., (Evans).

Antillocoris pallidus Uhler. Belleville, Ont., (Evans).

Banasa calva Say. Trenton, Ont., Sept. 21, 1901, (Evans).

Phimodera torpida Walk. "North West Territories," (record sent by Mr. Evans).

Thyreocoris montanus Van D. "British Columbia, June 10-20, 1905," (record sent by Mr. Evans).

Aelia americana Dallas. "North West Territories," (record sent by Mr. Evans). A rare form.

Zicrona cærulea Linn. Sudbury, Ont., (Evans).

Sciocoris microphthalmus Flor. Sudbury, Ont., 1886; Belleville, Ont., (Evans). When determining these Mr. Van Duzee remarked: "The only specimens from America which I have seen of this species, excepting one taken by Mrs. Slosson in the White Mountains."

Okanagana nevæboracensis Emmons. Sudbury, Ont., 1892, (Evans).

Orthoptera.

Dr. E. M. Walker has kindly sent me the notes on the species mentioned below, all of which he thinks are worthy of including here. His papers on "The Orthoptera of Western Canada," which have recently appeared in the *Canadian Entomologist* will undoubtedly lead to much greater attention being paid to these insects by collectors in the West.

Pycnoscelus surinamensis Scudd. One immature specimen.

Periplaneta australasiæ Brunn. Several immature specimens.

Nyctobora sericea Scudd. One mature specimen.

Panchlora virescens Sauss. Two mature specimens.

The above four species were found upon bunches of bananas, at Toronto, by Mr. C. W. Nash.

Chlöealtes conspersa Harris. Aweme, Man., July 22, 1910, 3 males, (Criddle). This species has been only once before reported from Manitoba, by Scudder, in 1862, (E. M. W.).

Melanoplus angustipennis coccineipes Scudd. Fort William, Ont., Aug. 2, 1910, pair in copula, (Walker).

Nemobius fasciatus abortivus Caudell. Fort William, Ont., Aug. 9, 1910, (Walker).

Odonata.

Dr. E. M. Walker, of Toronto, has examined, during the year, much material collected in different parts of Canada. Some of the specimens sent to him are of considerable interest. He has, therefore, been good enough to send me for inclusion here, the following records:

Lestes congener Hagen. Peachland, B.C., Aug. 9, 1909, 1 male, 1 female, (Wallis).

Lestes disjunctus Selys. Peachland. B.C., Aug. 9, 1909, 1 male, 1 female, (Wallis).

Nehalennia irene Hagen. Aweme, Man., July 4, 1909, 1 female (Criddle); Winnipeg Beach, Lake Winnipeg, Man., June 19, 1909, 3 males, 4 females, (Wallis).

Enallagma cyathigerum (Charp.). Nepigon, Ont., Aug. 8, (Walker); Lethbridge, Alta., July 5-9, 1909, (Wallis); Peachland, B.C., July 24, 1909, (Wallis).

Enallagma calverti Morse. Nepigon, Ont., Aug. 8, 1910, (Walker); Aweme, Man., July 1-24, 1909, (Criddle); Winnipeg Beach, Man., June 19, 1909, (Wallis).

Ischnura verticalis (Say). Nepigon, Ont., Aug. 8, 1910, (Walker). This appears to be the most northern record for this species, and the most westerly in Canada, (E. M. W.).

Ophiogomphus severus Hagen. Lethbridge, Sask., July 8, 1909, 1 male, (Wallis). First Canadian record, (E. M. W.).

Ophiogomphus colubrinus Selys. Nepigon, Ont., Aug. 6, 1 male, 1 female, (Walker). First Ontario record, (E. M. W.).

Gomphus olivaceus Selys. Peachland, B.C., Aug. 12, 1909, 1 female. First Canadian record, (E. M. W.).

The last three species were determined by comparison with specimens in the Hagen collection, Museum of Comparative Zoology, Cambridge, Mass., (E. M. W.).

Aeshna sitchensis Hagen. Ellis Bay, Anticosti Island, Sept., 12, 1 female, (E. V. Cowdry).

Aeshna umbrosa Walk. Ellis Bay, Anticosti Island, Sept. 12, common, (E. V. Cowdry); Winnipeg Beach, Man., Sept. 6, 1909, (Wallis).

Tetragoneuria canis Maclachlan. DeGrassi Pt., Lake Simcoe, Ont., June 24, 2 males, (Walker); Sudbury, Ont., June 11, 1892; June 6, 1893, 2 males, (Evans); Hull, Que., 1 male, (Fyles).

Cordulia shurtleiffi Scudd. Sudbury, Ont., June 26, 1892, 2 males, (Evans).

Somatochlora walshii (Scudd). De Grassi Pt., Lake Simcoe, Ont., July 2, 1 male, (Walker).

Somatochlora albicincta (Burm.). Aweme, Man., June 11, 1909, 1 female, (Criddle).

Libellula pulchella Drury. Fort William, Ont., Aug. 3, 1 specimen seen, (Walker). This is the most northern record for this species, (E. M. W.).

Leucorrhinia frigida Hagen. Sudbury, Ont., June 26, 1892, 1 male, 2 females, (Evans).

Leucorrhinia hudsonica (Selys). Sudbury, Ont., June 11, 1893, 1 female, (Evans).

Leucorrhinia borealis Hagen. Bird's Hill, Man., June 5, 1909, (Wallis).

Siphonaptera.

Several hundreds of specimens of fleas were collected by the Rev. J. H. Keen, of Metlakatla, B.C. These were submitted to the Hon. N. Charles Rothschild, who has determined the following species:

Ceratophyllus agilis. Specimens taken from Neotoma.
Ceratophyllus ciliatus. Specimens taken from Sciurus.
Ceratophyllus gallinæ.
Ceratophyllus charlottensis?
Ceratophyllus fasciatus.
Hystrichopsylla dippiei.

FINANCIAL STATEMENT

For the Year ending October, 1910.

Receipts.		*Expenditures.*	
Balance from 1909	$373 06	Subscription (Fletcher Memorial)	$50 00
Members' Fees	350 48	Annual Report	123 50
Reports and Back Numbers	199 07	Cork and Pins	76 95
Advertising	68 22	Salaries	75 00
Government Grant	1,000 00	Expense, Postage, Etc.	37 77
Printing	71 68	Insurance	26 00
Cork and Pins	103 02	Annual Meeting	43 25
Expense	20 00	Printing	1,002 90
Interest	13 89	Library	29 86
		Bank Exchange	4 23
			$1,469 46
		Balance	729 96
	$2,199 42		$2,199 42

J. E. Howitt, *Treasurer.*

Examined and found correct.

S. B. McCready,
J. W. Crow, } *Auditors.*

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ANNUAL REPORT

OF THE

Bee-Keepers' Association

OF THE

Province of Ontario

1910

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
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1911.

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WILLIAM BRIGGS,
29-37 Richmond Street West,
TORONTO.

To the Honourable JOHN MORISON GIBSON, K.C., LL.D., etc., etc., etc.,

Lieutenant-Governor of the Province of Ontario.

MAY IT PLEASE YOUR HONOUR:

I have the pleasure to present herewith for the consideration of Your Honour, the Report of the Ontario Bee-keepers' Association for 1910.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1911.

Ontario Bee-Keepers' Association.

Officers for 1911.

President: W. J. Craig, Brantford.
First Vice-President: D. Nolan, Newton Robinson.
Second Vice-President; J. L. Byer, Mt. Joy.
Secretary-Treasurer: P. W. Hodgetts, Parliament Buildings, Toronto.

Directors: District No. 1, A. Dickson, Lancaster; District No. 2, A. McLaughlin, Cumberland; District No. 3, M. B. Holmes, Athens; District No. 4, C. F. Chisholm, Wallbridge; District No. 5, Jas. Storer, Lindsay; District No. 6, J. L. Byer, Mt. Joy; District No. 7, J. F. Switzer, Orangeville; District No. 8, U. H. Bowen, Niagara Falls; District No. 9, W. J. Craig, Brantford; District No. 10, D. Chalmers, Poole; District No. 11, Miss E. Robson, Ilderton; District No. 12, D. Nolan, Newton Robinson.

Ontario Agricultural College: M. Pettit, Provincial Apiarist.

Committees:

Horticultural Show: President and Secretary, with E. Grainger and H. Sibbald.
Honey Crop: President and Secretary, with W. J. Craig and H. Sibbald.
Transportation: President and Secretary, with J. D. Evans.
Revising: M. Pettit and H. G. Sibbald.

Representatives to Fair Boards:

Toronto Industrial: J. D. Evans, Islington; W. Couse, Streetsville.
Ottawa: W. J. Brown, Chard.
London: F. J. Miller, Ealing.

Treasurer's Report.

Receipts.

Membership fees	$250 00
Legislative grant	450 00
Affiliated Societies dues	50 00
Entry fees, Horticultural Exhibition	3 10
	$753 10

Expenditures.

Balance due Treasurer	$64 26
Grants to Associations	231 80
Expenses for Convention	18 75
Committee expenses	10 00
Stationery	4 50
Periodicals	231 00
Cost of reporting	75 00
Revising report	7 00
Affiliation fee to Horticultural Exhibition	5 00
Incidentals	4 67
Balance on hand	101 12
	$753 10

Wm. Couse,
President.

P. W. Hodgetts,
Treasurer.

Audited and found correct, November 15th, 1910.

W. G. Lindsay,
Auditor,

ONTARIO BEE-KEEPERS' ASSOCIATION.

The Annual Meeting of the Ontario Bee-keepers' Association was held in the County Council Chamber, in the City of Toronto, on Wednesday, Thursday, and Friday, November 16th, 17th and 18th, 1910.

On Wednesday afternoon at 2 o'clock the President, Mr. William Couse, Streetsville, Ont., called the meeting to order and after welcoming the members called upon the Secretary, Mr. P. W. Hodgetts, who read the minutes of the last Annual Meeting, which were, on motion of Mr. W. A. Chrysler, Chatham, seconded by Mr. U. H. Bowen, Niagara Falls, confirmed as read.

PRESIDENT'S ADDRESS.

Wm. Couse, Streetsville.

As bee-keepers of Ontario, we have again been favored with a fair crop of honey and of good quality, and we have received fairly satisfactory prices.

Owing to the extreme heat during part of June and July, the clover was hurt to a considerable extent in a great part of the Province, and for this reason some of us did not receive the full crop that we had hoped for, but in the eastern part of the Province, where there was not such a good crop last year, they received it this year, so we can only say they deserved it.

As to the sale of honey, the demand seems to keep up. Last year we had a call for honey from the West such as never before. It seems to have improved this year on all previous ones, as I am not aware of any one bee-keeper receiving an order for five cars of honey from one firm previous to this year, and that at good prices and practically before the honey was produced. Those of us who have kept bees for only a few years may not notice the difference in demand, but those that have been selling honey during the lifetime of this Association, which is about thirty years, know that car-load orders were unknown many years back. We must give the West credit for the wonderful increase in demand, and as the population increases there, we should prepare to supply their wants. To do this, we must not forget that the quality of honey has almost all to do with creating demand. We are not boasting in saying we are proud of the quality we can and do produce, and as to quantity, per colony of bees, but we seem to get as much as any other country we know of. We have found that some of our best bee-keepers have tried far away fields in bee-keeping, but one or two seasons seem to satisfy them, and home they return to re-enter the arena here.

The Honey Production of the Province. From the yearly reports we receive, we can make a fair estimate, and to say that 5,000,000 lbs. were produced would be somewhere near the mark. This at first sight may seem an immense amount of honey, but if we supplied each person in our own Province with one pound, we would not have enough to give an equal amount to each person in the other provinces where honey is not produced to any great extent.

To What Extent Can a Larger Consumption be Created? As bee-keepers we all know that our own families, as a rule, prefer honey to fruit or any other table

delicacy (providing it is good honey), and we may fairly claim that each one of us consumes 20 lbs. If we would prepare to supply each person in Canada with one-fourth of this, or 5 lbs. each, we would to-day require a production of 40,000,000 lbs. of honey, as to-day's paper gives our population at 8,000,000.

Owing to the home demand for honey being so great, we have neglected the development of foreign trade. In conversation with Mr. C. C. James, Deputy Minister of Agriculture, a few days ago, he informed me that he had not found Canadian honey used, and named as such in the hotels in London, England, but had found Swiss, Belgian, Hungarian, Californian, and other foreign honeys, so it appears to us that there is a channel open to us now as never before to introduce our honey on the English and foreign markets. We all know that the Provincial Government has introduced Ontario fruit on the English market this season through their Commissioner (who is ours), and have been exceptionally successful in the venture, and that with perishable goods. Surely we as bee-keepers can fairly ask for some attention in the same line as the fruit growers, and I would suggest that this matter be brought before the Department of Agriculture, and that we ask their assistance and co-operation in this matter.

We need not fear to go into the venture if we can have the Department of Agriculture at our backs, as honey introduced in this way would have a standing such as no private individual could give it. We believe that we could send honey excelled by no other country, and only this should we send.

What is the Greatest Feature in the Advancement of Our Industry To-day? We believe it is the expert bee-keepers handling a great number of colonies of bees divided into several apiaries two or more miles apart. In this manner we have advanced greatly in the past ten years, and it only seems reasonable to look for something in the next ten.

What is the Greatest Detriment to Our Advancement? Foul brood, surely. We still have it to a considerable extent, and I believe our duty is to try and have all those that handle or attempt to handle bees know what the disease is and how to cure it. To accomplish this will take the time and energy of our best bee-keepers, whether they hold positions as inspectors or not. We believe that the Foul Brood Inspectors are doing an excellent service in spreading general knowledge in bee-keeping all over the Province, and we can only say, "Let the best men possible be appointed to the positions, and more of them."

Our Provincial Apiarist is now established at the Ontario Agricultural College at Guelph, where he has facilities to assist bee-keepers as never before, and we may suggest to him what we think best to experiment in for us. Any reasonable suggestions we make will receive careful consideration, and it would be wise for us to make them as practical as possible. To illustrate: It would not do us as much good to tell us that we produced 58 lbs. of honey per colony, as if he could tell us how to produce 68 lbs. with the same labor and expense.

Our Membership has Increased to a Considerable Extent. Our affiliated societies are the same number as last year. There should be a Society in almost every one or two counties, so that bee-keepers could have the advantage of having expert lecturers to address their meetings.

The Horticultural Exhibition is one of the institutions that is helping us, as in this we can show our produce to the consumer. I think we may well take up the idea of making county exhibits in the same manner as the fruit growers are doing.

Our Programme. We adopted a somewhat new plan in getting it up by asking each director to suggest topics, so that there would be something to suit the different parts of the Province.

Do Our Conventions Help us in a Practical Way? We may not notice very much during the days we are at the convention what it is, but there is some feature each year that we are benefited by, and we must not forget that what knowledge we have to-day of bee-keeping was given to us by many of those that are not with us to-day. There was a feature last year in our convention of a practical demonstration on raising queens by Mr. Clark, of New York State. From the discussion and practical work we have had on this subject, we are glad to tell Mr. Clark that he has not been forgotten. What about Mr. House? Well, he knows full well that he has done us a lot of good, and to show his unselfishness, it would take very little to have him come over the border to us. We have room for him along with many other people that are coming from the South.

Buckwheat Honey. We are yearly producing more, and from the position I was in last summer as Seed Inspector in the County of Peel, I learned why such is the case. There are several weeds, such as Twitch Grass, Sow Thistle, Bladder Campion and Canadian Thistle, to kill which farmers are cultivating their lands as long as possible in spring, and then sowing buckwheat to smother weeds and have a crop of grain as well. Until the weeds are got under control we may look for more buckwheat honey, and we must also take care of a market for it. Toronto is not anxious for buckwheat honey in the same way as Montreal. It is evident that we have been supplying them with good white honey, as the market here is still growing.

The Crop Report Committee will make some reference to their work.

Selling by Sample. When we sell by sample do we give an equal quality of goods? If we do not, we should, as there is nothing that will give us a bad name so quickly. In talking this matter over with a member of one of the largest purchasing houses in Toronto a few days ago, I asked him if they were disappointed by bee-keepers not supplying a quality up to sample. He said that he had found bee-keepers good business men, and that he had not been disappointed in the quality of honey furnished.

In the absence of the 1st Vice-President, Mr. W. J. Craig, of Brantford, on motion of Mr. W. J. Brown, Chard, seconded by Mr. Alex. Dickson, of Lancaster, Mr. Chrysler replied to the address as follows:

Our President touched upon the handling of honey in the Old Country, and said that honey was present in the London market from several of the older countries in Europe. I believe certain individuals in Canada have tried to sell in the Old Country market, but it has resulted in failure in the way of remunerative prices. The chief objection, I believe, is that the Old Country market is subject to the honey coming in from all over the world. Honey goes into the Old Country markets from Cuba, Hayti, Jamaica, Porto Rico, and all those southern countries. If they get three cents a pound for it in their own countries they are doing well, and when our honey goes into the markets of the Old Country we can't sell in competition with that. I believe, however, that their honeys would not sell in competition with ours, providing the people got a taste of ours and become used to eating our best Canadian honey. It can be put on that market by careful handling in a certain way, but I do not think individuals can undertake it, and it brings up that old subject I used to talk about—the co-operative handling of honey. Mr. Couse suggested that the Department of Agriculture be asked to do something in this matter. I don't think it would be fair to ask them to assist certain individuals.

but let it be general to all the bee-keepers; in this way you would need a co-operative association to include all the bee-keepers. This would ensure the proper distribution of only the very best honey. We could then work up a market for a good product, which you and I and all other bee-keepers have, in our own localities, done. It would, I am certain, work as well in a large way as it has in a small way with us.

The President touched upon the product of our Province—something about five million pounds of honey. I believe that is quite a conservative estimate; and I believe twice as much could be sold, providing we educate the public to demand good honey. Probably a co-operative association might help there.

This fall I have been sending some honey over to Detroit, and they have been paying the duty, and those individuals have come to say they can't get honey just like mine. What is the reason? There are good bee-keepers over there as you know. The wholesale houses probably get honey from some districts that is inferior, it is sold and distributed, and the people don't always get hold of the best article. Those individuals say, "There is a something about your honey that we can't discover in others," and yet they can't describe it. That something is nothing more or less than the flavor of well ripened and well sealed honey of the best clover before it is extracted and sealed up in cans. That honey will tell every time. I consider that is the secret. There is a bee-keeper in Michigan who extracted his honey thin, and evaporated it, and it granulated, and he asked me what was the matter with that honey. It was good honey. You can hardly tell him what is the matter with it, but there was a something about it that the people who are used to eating good honey did not like, and they want the kind of honey they had before.

The President touched on keeping more bees to produce more honey and extend our market as well and make it more profitable for the bee-keepers. I find most of us bee-keepers are not working ourselves to the limit in keeping bees. I know I have got into some difficulties in times past and got overworked, and found a new way of doing things with less labor. I found when I established an out-apiary that I learned more about bee-keeping in one year than in five before. I had quite a few mishaps, swarm losses and so on for a couple of years, but I can safely say now I have no fear. I can go out to them once a week and have practically no loss of swarms, and it is one of the most profitable parts of my business. If I make $50 for every day I go out there I think I am doing first rate.

As to the foul brood situation, it is a bad thing to have foul brood in one's apiary. If we get it once and can get it cured we have gone through an experience that will fortify us, I think, against future attacks of it. I, as inspector, for the last three years have found it hard to have bee-keepers follow the instructions correctly, in a great many cases. There are others who won't put forth very much effort to cure it, and there are some bee-keepers whom I don't feel very sorry for if they lose their bees, from the small amount of effort they take to cure it. I doubt if we are doing as much as we can in getting rid of foul brood. Wherever I have found foul brood, it existed there fifteen or twenty years ago, I find traces of it there yet. I have an idea of how to get rid of it more speedily, but probably it might not meet with the endorsement of the Department or the rest of the bee-keepers. However, that is an after consideration.

With reference to the honey at the Exhibition, I was sorry not to see more of an exhibit there. I can partly see the reason for this, however, as no exhibitor is allowed to show honey except his own. I may have some nice comb honey, but if I have no good extracted honey I do not care to exhibit. I will not go to the ex-

pense. I think it is right and proper that if an exhibitor wants to send a certain item on the exhibit he should have the privilege of sending it there and having it put up in the best possible shape by someone appointed for the purpose if he can't do it himself.

MR. BROWN: The foul brood question has always been touched upon in the President's address. It has been brought forward and discussed from year to year at every annual meeting. For a number of years we had one inspector to look after the interests of the bee-keepers in regard to that disease throughout the whole Province. Now, I would like to know from this Association, is foul brood increasing or decreasing in the Province? If it is increasing then what is the use of having sixteen inspectors where one does the work? If one inspector was keeping it in a normal condition why should sixteen let it remain the same? It surely must be decreasing. I hope to find out before this meeting adjourns that it is decreasing to a great extent.*

With regard to the honey exhibit at the Fairs there is evidently something wrong. Why is it? That question remains to be discussed and brought forward. Each one may not view the difficulty from the same standpoint. For my part, I do not think it is fair to give 75 per cent. of the points for the display. I think that should be done away with to a great extent, because it is simply giving the man with the most gold in his pocket the best chance to get the red card. I don't think that is fair. I think some of these points should be given for the quality of the honey. We all advocate the production of a good article. If so why don't we get credit for it? Again, there is only one prize given, I understand, for display. Well, there may be a dozen exhibitors who are trying to get the red card in that display. The man who wins a prize perhaps is not as much entitled to it as the man who does not get a cent. Why not divide it up and give the other men a chance?

With regard to the market, I have, as you are all aware, advocated cultivating the home market. Encourage it, do the best you can to get honey sold within your own country. The foreign market will take care of itself. We have evidence to show that there are now 100 pounds sold where ten years ago you couldn't sell ten pounds.

MR. ARTHUR LAING, Simcoe: As some of you know, I have been an exhibitor for several years at Toronto Exhibition, and I agree with Mr. Brown on nearly everything he has said in reference to the exhibiting of honey. Take, for instance, the matter of display. Now we must allow reasonably for display. On the other hand the thing has been carried to such an extent at the present time that it is almost out of the question for a man to go to Toronto Exhibition and expect to make anything. This year my wife and I actually put in a month's solid work on that Fair, and if I had put my honey in glass at home and shipped it out, which I could have done in almost a week's time, I would have been just about as much money in pocket. I think we got about $50 for our month's work, for the two of us.

Mr. Hurley was saying in the *Bee Journal* that he was surprised that the industry of this Province was only represented by four or five exhibitors at the Toronto Fair.

DR. C. GORDON HEWITT, Ph.D., Entomological Department, Ottawa: Your

* Until additional inspectors were appointed, no systematic inspection of the apiaries of the Province was carried out. The first year under the new system disease was discovered in practically every county visited. As a result of the old system, the disease had been allowed to spread without hindrance.

President has referred to this question of foul brood, and that has naturally been interesting me, as the Dominion Entomologist, to no little extent on account of its occurrence in the different Provinces in Canada. You are not the only Province by any means which enjoys the privilege of having your apiaries devastated by these two serious diseases. In Quebec I should think it is quite as serious as in Ontario. I have had samples of brood sent to me from Manitoba which is also infested with foul brood, and it occurs in British Columbia; and therefore that whole question is one which you don't enjoy the absolute privilege of, but it is one which affects the whole of Canada together.

Then also with regard to your production of honey. I have listened with very great interest to the accounts of your production here in Ontario, where I understand you produce between four and five million pounds of honey per year. One or two of the members have been discussing about entering the British market. Although I have nothing to do with the commercial side of the question, it seemed to me, merely speaking as a lay person from an outside point of view, that it would be far better for you to supply your Canadian market first until that gets glutted. In view of the splendid transportation system which you have here, I think it would pay Canadian and Ontario bee-keepers commercially to still continue to supply and to cater for that market, because we hear Canada is increasing annually, between 300,000 and 400,000 people coming in every year, and therefore you will have always a big market in the west for your goods. British Columbia is growing very much as a fruit growing country, and with that they are increasing their bee-keeping industry; the Western Provinces are also increasing the number of hives which they have, and therefore you will not enjoy the privilege for ever which you have enjoyed in the past of having such a very high and unattainable position in the way of bee-keeping. That is why I say that rather than spend your time and efforts in trying to capture or enter a market which is somewhat ephemeral it would pay you far better to cultivate the markets which you already have, and try to better that; because you must remember in talking about the English market, as one speaker has called attention to this afternoon, that you have to compete with countries which can produce honey at a far less price than you can here in Canada, where you command a higher price than those other countries producing this honey, and therefore you have to demand a higher price in the country to which you ship your honey. I think those points should be remembered.

With regard to the question of foul brood, that is certainly the most serious question we have to face as bee-keepers in Canada, and as your President said in his address, and rightly, it is the greatest deterrent which you have to-day in bee-keeping.

It seems to me that the greatest good can be done at present by the action of those bee-keepers who are really interested in bee-keeping taking it into their own hands to look after those bee-keepers who keep a few hives of bees and are really not sufficiently interested in the welfare of their brother bee-keepers. It is the same all the world over in everything that where you have these serious diseases, no matter whether it is a disease of human beings, cattle or fruit, it is always the indifferent persons that are the chief drawbacks and who stand in the way of progress. And therefore as bee-keepers, taking such an interest as you do in the future and in the progress of bee-keeping in Ontario, the best thing you can do is bring those indifferent bee-keepers into line—those who keep just a few hives of bees and do not take the trouble or necessary precautions to look after them. Bring them into line and apply that most useful moral suasion; and if moral suasion won't do, use physical suasion in the way of dealing with infected hives.

You have in Ontario a most excellent system of inspection considering the facilities which have been available in the past for training inspectors in this question, and you are also fortunate in having recently appointed a Provincial Apiarist who has the welfare of the bee-keeping industry in Ontario at heart. You have a man there, and you have a department there, where you can train men in all the practical and scientific aspects of bee-keeping; and you will be able to turn out now, if you will only support your department and take the necessary steps, inspectors, trained men who will be able to tackle any problem. Thus you will gradually attain a more scientific character in bee-keeping, and put bee-keeping in Ontario on an entirely different basis, and one which will be necessary in view of the very great advance which is being made in bee-keeping along the line and especially below the line in the States.

In Canada we shall have to keep ahead on this question, not only in its practical but in its scientific aspects. When one looks at the work that is being done across the line in the States, not only in the State Department, but also in the Federal Department of the United States, we are all the more determined and all the more aware that we shall have to move and bestir ourselves if we are to retain the position as vendors of honey in Canada that we enjoy at present; because with increased bee-keeping in the States you will naturally get an increase of the amount of honey exported from the States into Canada, and I think the problem is one very analagous to the fruit growing problem where there is healthy and friendly competition. I didn't think I could tell a body of practical bee-keepers anything they did not know about the treatment of foul brood, and I am still convinced in that opinion; but I would assure you as representing the Dominion Department of Agriculture that we have this question of foul brood most deeply at heart as it concerns not only the Province of Ontario but also the other Provinces of Canada, and we shall at all times endeavor to help on this industry and the stamping out of this disease so far as we are able.

I must express the very great pleasure it is to me to attend in this manner, as my first meeting of the Ontario Bee-keepers' Association, and I hope it will be the first of many pleasant meetings not only in an official way, but also in an unofficial way, and if I can help you at any time I can assure you it will be my greatest pleasure to do so.

THE PRESIDENT: We are all pleased to have Dr. Hewitt with us, and to know that an interest is being taken by the Dominion Department of Agriculture in this matter. In reference to black brood or European foul brood you have had samples. What is your opinion of them? Where do they come from generally?

DR. HEWITT: That is rather a difficult question to find out. That is the question which Mr. Pettit and I have been racking our minds about. We have been trying to trace out instances which are alleged to have come over from New York State. Several complaints were made by bee-keepers in Ontario as to the introduction of European foul brood from New York State, but on thoroughly going into the matter, both on this side, and also taking it up with New York State officials, I have been unable to trace any definite instance where that was the case; and, of course, European foul brood is all through Quebec. It is extremely hard to say from where and when it was introduced into this country. The chief thing is it is here, and we have got to fight it.

MR. PETTIT: As to the matter of European foul brood, there is one instance that we know came across from New York State. In the case of Trenton district, I see by Mr. Scott's report that the infected territory has increased from 100 square miles last year to 400 square miles this year, and no one knows how it got into that district.

A YEAR'S EXPERIENCE WITH CLARK'S SYSTEM OF QUEEN REARING.

H. G. Sibbald, Claude.

At our annual meeting one year ago we were fortunate in having with us Mr. P. C. Clark, of Borodino, N. Y. He gave us a valuable address on queen rearing. It was better even than an address. He brought with him all the necessary tools, implements, hives, etc., and demonstrated in a plain, simple, practical way how to proceed in order to raise our own queens.

The scientific principle of artificial queen rearing is well known to most, if not to all, bee-keepers—that we could make the queen cells, graft into each a little larvæ between two and three days old, and produce from what was intended to become only a humble worker bee a queen capable of producing or reproducing thousands and thousands of her kind. Many of us knew this, I say. We needed only the demonstration that Mr. Clark gave—the just how to do it touch—and we we have gone and practiced his system, and I have been asked to tell you how successful it has proved with me.

We started in to make the queen cells with half a dozen sticks similar to wooden rake teeth, marked 9-16 of an inch from the tip, and soaking in a tin of cold water until the wax in another tin, melting over an ordinary coal oil lamp, is ready for dipping—which is as soon as it is melted, the flame of the lamp being lowered and fresh bits of wax added from time to time in order to keep it at just the melting stage. The sticks are then dipped down into the melted wax, the first time up to the mark, 9-16 of an inch from the tip, withdrawn until the wax cools and again and again dipped—each time not so deep, however—until a cell of sufficient strength is obtained, when it is twisted off, ready to place on the frame or cell bar. This I easily managed by holding the cell over the flame of the lamp until it began to melt, and then pressing onto the bar.

Royal jelly must be obtained. If we have swarming colonies it is easy; if not, some colony must be made queenless a few days before. The cell containing the jelly is taken, the sides of the cell broken away to get down to the jelly, which is mixed with a little saliva to thin it and make it smooth and even. A little is then placed in the bottom of each of our cells on the cell bar. Mr. Clark recommended using an ear spoon for this work, but not having one, I used a match, dipping the flat end into the jelly and then touching it to the cell bottom. I have no doubt that the spoon would be an improvement, as it took too much time with the match. However, we managed to get along. One cell of jelly, with young larvæ removed, would do 12 to 16 cells. Apart from the subject a little, I tried grafting larvæ into cells without jelly, and as far as I could see in only one experiment was it just as successful. The third manipulation was to obtain a comb of brood from our best queen colony containing a good supply of larvæ between two and three days old. Some practice and study is necessary to be able to guess the proper age. Mr. Clark suggested putting a comb into a hive. In 24 hours, if in the honey season, it will be filled with eggs. In three days more they hatch. In 30 hours after hatching the larvæ is ready to graft. Do this once; then you can pick out the proper aged larvæ from any comb. Having obtained the proper comb, brush the bees off it and take it away to a light, warm place to operate. Select the part of the comb having the desirable larvæ, and with a sharp honey knife pare down the sides of the cells as low as possible so as to get at the larvæ easily. Then with a bent quill tooth pick or similar instrument gently lift out the larvæ and place into the prepared cell and so on until all on the cell bar are occu-

pied. These are next placed into a queenless colony, without any other young larvæ, and plenty of young nurse bees where they will be started and cared for attentively. After 24 hours in this colony they can be removed to a cell building colony, which is a colony in swarming condition or superseding, the cells, of course, being placed either above an excluder or at the queenless side of a queen-excluding division board in the brood part of the hive. In about 10 days after grafting they will be nearly ready to hatch, and should be removed to nuclei. I did not follow Mr. Clark's method of forming nuclei, and so will go more into my success or failure in following out the above, which is, as I understood it, the main feature of his system.

You all remember to your sorrow the peculiar spring of this year. It was late before I got started to raise queens. My bees were not in a swarming condition at all, and having good young queens, none superseding, I had therefore to raise my first in queenless strong colonies and they were not as large as those raised later in the swarming hives. I did not get as many started as Mr. Clark said one ought to. Out of a dozen cells my average would probably be seven or eight. Once I had the whole dozen started, but they were left in the queenless colony, and one hatched before I attended taking them out and destroyed nearly all the others. I had several experiences like the above. However, I was successful in raising between 250 and 300 queens this past season, and am quite proud of most of them; and with the usual bee-keeper's optimism I am looking forward to doing greater and better things in the following out of Clark's system of queen rearing in 1911.

Mr. Pettit: This subject of Mr. Sibbald's, next to the question of foul brood, is the most important subject we have in bee management. The matter of queen rearing comes in very close touch with the handling of foul brood, when we consider that our real problem in the disease question is European foul brood, and this disease is not cured unless the bees are Italianized. Mr. Scott mentions that in his report. I am anticipating the Inspectors' reports a little, but I feel like hammering on this one point as much as we possibly can. Mr. Scott says in his report that the territory he went over last year where the bees were treated successfully and the owners did not Italianize, were just as bad again this year, and were in many cases completely wiped out; whereas if they had been Italianized they would have been all right. Mr. Scott, being right in the middle of the district, reports a splendid crop of honey from his own apiary because he Italianized and is out of trouble with the disease. As Mr. Clark told us last year, it is not a question of having the market for the queens, it is a question of having the queens for the market, and the enormous amount of Italian queens needed raises the question of necessity of easy methods of rearing Italian queens. What really can we do to encourage the Italianizing in European foul brood districts, and all around them?

Mr. H. E. Eyre, Chantry: Are we to understand as to the treatment of European foul brood that we have no surety of success unless we do Italianize, and if we do Italianize then we have foul brood cured?

Mr. Hurley: You must have the colony queenless while they are cleaning it up.

Mr. Eyre: How long will the colony work when the queen is out?

Mr. Hurley: Mr. Alexander says about 24 days, although Dr. Miller says in conjunction with Mr. Alexander's method he can keep them queenless for 15 to 20 days and succeed in getting them cleaned up, and then introduce the queen cells.

Miss Ethel Robson, Ilderton: I read the directions given in the report of last Convention and made an attempt at it. I raised somewhere about 50 queens.

When I accomplished it I found it very simple. With reference to the matter of royal jelly in the cells, I found it depended largely on the colony where they cleaned it up. If it was a colony ready to accept the cells and go to work I do not think they took the royal jelly out, because shortly afterwards they were adding to it rather than taking from it. The method I followed in growing the cells was a little different from that described. I did not begin till fairly late in the season when the colonies were getting in pretty good shape, and then I gave extra brood to those to make them a little stronger. I placed brood in the supers, and I would only take a hive that had a super well filled with bees. Then I placed my stick with the cell cups in it in the super with the queen down below under the excluder, and in very few cases did they fail to draw out nearly all of the cells. On an average I didn't count on more than about eight or ten cells from a good colony, but they would draw them out and draw them out well and take care of them until they were ready to put them in again. It really made it very simple: I have something now where I think you will say the woman has an advantage over the man as a bee-keeper. When I prepared my cells I did not use the implement recommended by Mr. Clark. Being a woman I used a hair pin; it was always handy, and one of the larger kind served fairly well to spread the royal jelly. For transferring larvæ, if you want to do it easily, get a fine hair pin and you can lift them out beautifully, and you do not even have to cut the cells down very far; you can lift them out every time. Of course you lose some, as Mr. Sibbald did, by them hatching before you expect, and you lose your reckoning; but you do not need to buy very many queens to requeen your yard.

Mr. Dickson: Mr. Pettit spoke about the introducing of Italian queens as much as possible. I want to say to every beginner who has got the black or German bee, begin to Italianize as quickly as you know how. We hear a good deal about European foul brood, and I was surprised to think it was so prevalent in Quebec. As inspector, my territory is right on the border of Quebec, and I must say the bees are pretty much all blacks. I advised every bee-keeper I came across to go in for introducing the Italian queen as quickly as they knew how. I even spared a little time to tell them how to go into it. Italianizing is easily done. I fall back on natural queen cell raising every time for myself.

Mr. C. F. Chisholm, Wallbridge: I live close by Mr. Scott. I think one of the great dangers with reference to European foul brood in that section has been by moving bees from diseased parts to parts that were not diseased. I know or have heard of two or three cases. I think as an Association we should ask our authorities to require an Inspector to inspect bees if they are to be moved from a section where there is disease to a section where there is none.

Mr. Jno. Timbers, Cherrywood: I suggest that instead of having someone to lecture to us we should have more demonstrations, similar to that which Mr. Clark gave us last year.

Mr. R. Lowey, Cherry Valley: Is the black bee really an inferior bee to the Italian? I am a friend of the black bee, and I would like a demonstration from somebody that the Italian is a superior bee in the bringing in of honey or money. I never yet had an Italian queen whose colony would produce in a season the amount of honey my blacks or browns or Germans or hybrids or whatever you like to call them, would.

Mr. Pettit: If European foul brood strikes you you will get rid of your blacks all right.

MR. CHRYSLER: If you Italianize your apiaries, and do not keep rearing more Italian queens and reproducing the Italians, your bees will gradually get darker year after year, and I believe you will get nearly black bees in time. I am a friend of the black bee only for one or two reasons. I would never think of Italianizing if it were not for the facility of handling them, and as this black brood may give us some trouble it may be some help in that respect, but otherwise it seems to be a death blow to good comb honey to get rid of the black bee.

MR. SIBBALD: I think it is a pity to let the black bees get so much credit. A few years ago I was just as ignorant as my friends who have just spoken; many a time I have advocated dark bees in this Convention, and some of the members that have been here will remember it, likely, but I know better now. I am learning all the time and I hope they will learn, too. There is no comparison between the black bees and the Italians. We had this year in our home apiary just three colonies of black bees left, and they would come out and attack the boy when he was mowing the lawn, and he knew where those black bees were without looking at them to see the color. That is enough to change me.

MR. D. ANGUISH, Lambeth: Did you never have Italians do that?

MR. SIBBALD: No. The strain I have now are not nearly so cross.

MR. BROWN: You want the Cyprians to do it.

MR. SIBBALD: I could this year walk through my yard of 170 colonies without a veil on, and I could work in it without being stung. As far as getting honey, the Italians on the average will get more honey than the black bees. You may get one good colony of black bees and have another one or two that are not in shape and don't do so well. As far as getting nice comb money, all the difference is in the capping; the Italians will cap a little closer to the honey, but they will fill the sections better than the black bees; that is fill them out closer to the outside; and taking it all through I would prefer the Italian bees to the black bees for comb honey.

In this year's work in my own apiary I raised probably between 250 and 300 queens, and on that alone I must have saved $150, whereas the year before I bought these queens. I found the work pleasant; it does not take very much time, and I am sure that any bee-keeper that will just make the attempt to raise his own queens will be, to use a common expression, tickled to death.

MR. O. L. HERSCHISER, Kenmore, N.Y.: There is one matter Mr. Sibbald spoke of in which I am sure he is wrong, and that is as to the temper of black bees. I have four apiaries, and one of them is composed almost entirely of black bees, and that is the only yard I can work in all day without using a veil. However, there is another point in reference to the black bees in which he is right, and that is that they are not on the average as good honey gatherers as the yellow bees. I have a few Italians in this yard of black bees and comparatively they store about one-third more honey than the average of the blacks, so that I am convinced that the Italian bees are better on the average for gathering honey than the blacks. I have found that my Italians are a little more vindictive than the blacks; that is I have got to use a veil and smoke more freely. That may be caused by the strain of bees.

MR. LAING: I don't agree with Mr. Herschiser in reference to that matter of temper. I am inclined to agree with Mr. Sibbald. I had that demonstrated to my satisfaction this summer. I had a yard of about 75 colonies, and they were principally blacks; and I not only had to wear a veil, but I actually had to put on long-sleeved gloves, and they would sting me everywhere they got a chance even through the clothes and gloves. During the summer I happened to go down

to Mr. Pettit's yard, and I was really amazed at the difference in that yard, practically on the same day I had left my own, and I hadn't been stirring my own up either. I went down there and he was extracting honey, and had two or three men working around, and yet they were as quiet almost you might say as flies. They made no attempt to sting whatever.

Speaking of Italianizing, I think most of the intelligent up-to-date beekeepers know there is a wonderful difference in what are called Italians. In the Island of Jamaica, I had some experience with what they call Italians; but I think there was considerable Cyprian blood in them, and they were certainly savage with a vengeance. I had a few of those along with the blacks which were supposed to be Italian bees. I don't believe they were Italians at all; they were yellow enough, but they were just as savage as the blacks.

Mr. Chrysler: While I have been inspecting I have occasionally run across several places where they were as near as I could judge pure black bees and they were very very quiet. Whereas, in other cases, they were the most vindictive and crossest bees I ever had anything to do with. It seems to me there is a vast difference in the black bees.

Mr. I. D. Evans, Islington: My experience is that if you get pure-bred Italians they are quiet, or pure blacks they are quiet; but if you get a black with a small portion of Italian blood it is ten times worse than either. The blacks are great cowards, and when you smoke them they run clean off the comb, and you don't have any trouble brushing off the bees. The Italians will stick their noses in the cells and stay there, and you have to brush the whole lot off. However, I have Italianized mine altogether. I bought nearly 100 queens from Mr. Moore, of Kentucky, and I think they are far ahead of anything in the black line.

Mr. Anguish: I think it pretty nearly all depends on the man whether they are cross or not. I was running a yard for Mr. Alpaugh one year, and we always had harmony there when I was running those bees. They were Italians and mixed. Another man ran them the next year, and he had to run them off the farm, as they stung the cattle. He had to wear mitts in May. I have nearly 300 colonies of bees, and they are principally black. You must know the nature of your bees. As far as honey gathering goes, I have got black colonies—they are not altogether black, either, they are crossed in with Italians—that will compare with any Italians, and for comb honey I want the dark race of bees. Some say the Italians will fill the sections a little fuller. Maybe they will, but I cannot see it that way. Take capping and the Italians are not in it at all. In the first place they won't cap smoothly; it is all rough, like water when the wind is blowing over it. In the next place they fill the cells too full. It always looks watery. So I think it is the man as much as the bees, after all.

Mr. Wm. McEvoy, Woodburn: I agree a good deal with what Mr. Anguish says. In all the bee journals you see pictures given of people wearing veils. I would feel ashamed to have a veil on. I have not worn a veil in over 30 years. You can't find one around my place, and I have handled all kinds of bees. I will guarantee to handle the crossest colony of bees you can produce, and inside of five or ten minutes at the outside I will agree to shake the bees in my face and not get stung. I think there is too much veil work, and as for mitts that is out of the question. Mr. Anguish spoke about the blacks filling the comb fuller. That may be so, but they cap the cell closer, and the least chill or moisture swells the honey and the capping looks kind of soaked. I will agree with him that it is the prettiest comb honey, but at the same time I don't want the blacks.

Mr. John Newton, Thamesford: I don't feel ashamed to wear a veil. I was with Mr. Hall for years, and I never wore a veil; but I don't think I could do the same work without a veil as with one. I think this discussion this afternoon has been very profitable. I used to advocate the black bees entirely, but I have come to see things in a little different light in later years. I believe there is a great deal in the bee-keeper himself. There is so much of the Cyprian blood introduced to-day into the Italians that the more you smoke them the worse they will get. I believe the black bees give us a little nicer comb honey, but unless it is for exhibition purposes I think it is quite salable and pleasant to the eye even from the Italians.

Mr. Hurley: I have had experience with the black and Italian bee and I can say that I think the black bee is just as good a honey producer all round as the Italian. But there is this against the black bee in my experience: if you open the hive and smoke them they will rush with great excitement out of the hive at the front and come up the sides; they are a more excitable bee and they are a little bit crosser. On the other hand the Italian is a nicer looking bee. I believe that is a great part of the favorable attitude that bee-keepers assume towards the Italian bee, because it is a more handsome looking bee and makes a mental impression which is favorable to that bee. I prefer the Italian bee, but from my experience of the black I would not say that the black is not just as good a honey producer as the Italian.

Mr. Pettit: The question before us is that of European foul brood, and the relative merits of black and Italian; all the minor points drop out of existence when you consider Mr. Scott's district increasing from 100 to 400 square miles with foul brood. When we have these facts put before us, and we see businesses ruined because of the fact that owners have failed to Italianize, then I consider all these other points with reference to black and Italian bees have no importance to us at all this afternoon. We must Italianize in the face of European foul brood which is bound to sweep over Ontario as it has over the States.

Mr. McEvoy: Mr. Pettit spoke about European foul brood. Why not call it black brood? That is really what it is, and it is the outcome of black bees and their crosses. Italian bees are the greatest preventive. They take the disease just as well, but they are the best house cleaners and the best brood feeders. The others are miserable feeders. I don't like the blacks at all on that account. Why not breed the Italian? They will give more honey, and they will prevent the spread of the disease.

Mr. L. Beaupre, Forrestville: I would like to ask Mr. Sibbald his method of handling nuclei.

Mr. Sibbald: The method I have followed in making nuclei is to take one or two combs of brood up from the bottom and place it in the top story, and in about a week's time after that lift that out with the bees that will adhere to it, just as they are, and place them in the hive with a division board in it or a hive with a fixed division board in. It is all the same. Then give them a queen cell and when that queen is hatched and mated and commences to lay it is taken away and introduced into the full colonies which are arranged, and another queen cell given to the nucleus, and in that way I keep the nuclei busy for a couple of months in raising queens.

Mr. Laing: After the nucleus is made and the queen is mated,, when you want to introduce that queen to another colony do you take the whole business or just the queen?

Mr. Sibbald: I take just the queen. Of course you can make as many as you like that way. If you have 100 colonies you can make two out of each one.

Mr. Laing: What is your method of introducing?

Mr. Sibbald: I have different methods for different parts of the season, but if I have a hive marked to change the queen, and I have a queen ready to put in I go and catch the old queen and put her in the cage and leave her in the cage, and towards evening take her out and put the young queen in her place in that very cage; I put a little perforated capping of wax or anything over the stopper to keep her from coming out immediately, and just let the bees release her, and probably she will come out in 24 hours and I don't have very much loss in that way. I can do that in the out-yards, fix it all up while I am there, and then the queen will be introduced before I go back again.

Mr. Galbraith: In your raising of those queens are you able to have all of the same color, or do you have some leather colored ones from the same larvæ you have taken out of this frame? I can't get them to come out all of one color?

Mr. Sibbald: I find that trouble, too. Perhaps out of a dozen queens I would get two that didn't please me in color, quite a leather color, and I usually killed them. I didn't like them. Another cause for that is if they are a long time in hatching they will be nearly all dark color. The temperature and lack of nourishment would seem to bring an inferior queen, and the inferior queen seemed to be dark. I think I have noticed an Italian colony of bees will produce brighter bees in the honey flow than late in the fall.

Mr. Pettit: Is there any real difference in the quality of those bees except the color?

Mr. Sibbald: No.

Mr. F. J. Miller, Ealing: I think you will find queens raised early in the season or late in the fall will have that variation. Your queens will be darker as well as have somewhat of a different appearance. That has been my experience. I have not had anything to say about this queen rearing from the fact that it was Mr. Clark's system, but I would like to say a little. I think it would help some into a nicer method of handling those cells if the Pratt system was looked into and practised. I used the Dolittle, when Dolittle first wrote his work, which is now the Clark system, and I enjoyed the work very much and I raised nice queens; but Pratt went into that at a later time and perfected the system whereby you can have a great deal more pleasure in your work. You can go and inspect those cells, in caging them on the Pratt system, through your cover. You don't disturb your colony at all in handling your cells until you cage them for your nursery or wish to insert them in your nuclei. You use the flange cell cups. The cups hang on a flange through your cover, and then you place another cover over it, and in examining those and changing them you simply raise your outer cover and lift your cell along with your bar. It makes the work a great deal simpler and more pleasing, and you are apt for that reason to make a better success of it.

Mr. Beaupre: By caging those old queens are you troubled with queen cells being built below?

Mr. Sibbald: They might start queen cells below, but as soon as the young queen gets out they will destroy them.

Mr. Timbers: I would like to ask Mr. Sibbald if he didn't, when he was taking the cells off the bar, break some sometimes?

Mr. Sibbald: I made a very much heavier cell than Mr. Clark recommended. He said dip three times and I found that those were not very strong, but I found it was better to dip a dozen times and make a very strong cell and then you could

handle them with your fingers and there wasn't any danger of breaking them at all.

MR. TIMBERS: That was my experience. I broke some, and to overcome that I used gun wads.

MISS ROBSON: I found this summer that I had some weak colonies. In the spring I found it was a great advantage to divide those weak colonies up into nuclei, and have them ready for introducing young queens.

QUESTION BOX.

Q.—*How many bees can one man care for, for comb honey and for extracted honey?*

MR. MILLER: It depends on the man. I have been giving my whole attention to extracted honey. On the other side they seem to be producing comb honey on a large scale with little help. On extracted honey some years ago I put it at 500 colonies, and I have never taken it back.

Q.—*Do bees require any more air space in the cellar than on the summer stand?*

MR. DICKSON: Yes, I think so.

MR. BOWEN: That depends on the cellar. A good cellar with even temperature does not require any more, if you have a good sized entrance on the summer stand. When I put them in the cellar they are just the same as outside.

Q.—*What is the right temperature for a bee cellar?*

MR. BROWN: Forty-five degrees.

MR. TIMBERS: Forty to forty-two.

MR. EVANS: I think that depends on the cellar. If a cellar has no artificial heat and is damp probably 45 is all right. In my cellar I would rather keep them at 38. Mine is next a furnace where I can open the door and warm them. I keep my frames an inch clear of the bottom board. The cellar is so dry that if I put in wet hives in three days they would dry out. I think possibly sometimes they suffer from drouth.

MR. PETTIT: It depends a great deal on the kind of cover that is on the hive. If there is simply a cloth over the hive, or if it is a real thin cover the temperature needs to be warmer than though there is is a good chaff cushion or something warm. For my part I prefer a low temperature cellar, and some warm covering on the hive, so that there will be a decided difference between the hive temperature and the cellar temperature.

MR. TIMBERS: I do not average a loss of more than two per cent. I slip inch blocks at the back of the hive; I take the lids off and leave the cloth just the same as they are on the summer stand. I used to keep it 42 to 44. My cellar is very dry and I like to have a little snow so that I can fill the entrance full of snow when I carry them in. I find they are nicer at 42 and 44 than when they are down to 40.

Q.—*Have you noticed that both Italians and blacks are very cross when honey is very plentiful?*

MR. I. F. SWITZER, Orangeville: No, I have not noticed that.

MR. DICKSON: That has been my experience.

MR. LOWEY: I have always noticed the reverse of that.

Q.—*What is the best method of transferring bees from old to new hives, and the best time to do it?*

Mr. Sibbald: The first bees I bought were in box hives and I have not had any experience since. The time I transferred them was in the early part of the clover season. I left them alone and let them swarm. I hived the swarms in new hives. Then I had only one yard and I was there all the time, and the second swarm would come out and I would hive that in an empty hive, and right away the same day I went to the old hive and smoked it and rapped it until the bees would run up into the second swarm; and then I went to work and cut out the combs and transferred them into movable frames. I found I had not much tender brood to interfere with me. It was nearly all hatched, and there was not a very great deal of honey in the hive either.

Mr. McEvoy: I followed that for ten years. I took the box hive and stood it up, gave it a charge of smoke and split it off all round with the axe. That was about the first of June. I cut the comb out and placed it in the box and wired it all round, so that it couldn't tip over either way.

Mr. Sibbald: I found ordinary wrapping cord better than wire.

Mr. Herschiser: A few years ago I had a yard of bees composed quite largely of old box hives, and I made no attempt either the first year or the second year to transfer any of them. I found I could transfer them without half trying. I put on several upper stories without a queen excluder, and the first thing I knew they were using the upper stories instead of the lower ones for brood chambers, and all you had to do was take the lower story away and smash up the combs and melt them up for wax and your transferring was done without any trouble.

Mr. Chrysler: I find if you turn a hive bottom side up it is a little better than taking the top off.

Mr. Pettit: Langstroth describes a very good way of transferring. Simply turn the hive upside down and have what he calls a cluster box to set over it and drum them up into that. After they have filled themselves they will go up and cluster like a swarm and you can treat them like a swarm.

Q.—*What is the best veil and best gloves to use?*

Mr. McEvoy: None.

Mr. Herschiser: Mr. McEvoy is half right and half wrong. Use no gloves and use a veil. I go and buy a piece containing several yards of common black mosquito netting; it will make quite a number of veils, and for 50 or 60 cents you can get half a dozen or a dozen veils for the price of what they call a good veil made of French tulle.

Q.—*Would nuclei live which are made in September or October?*

Mr. McEvoy: That would depend upon the age of the brood at the time in September, and upon the man and where he kept them.

Q.—*Give a satisfactory method of crating honey to ship to the west in ten-pound pails.*

Mr. Chrysler: I put six in a case, 2 x 3, with hardwood ends 7/8-inch thick and soft wood 3/8-inch stuff for tops, bottoms and sides; that has been satisfactory with me.

Mr. Newton: I go to my store-keeper and ask him to keep me all the soap boxes he has. I get them at five cents apiece. They nearly all hold the 10-pound cans, which makes a nice package for five cents apiece.

Mr. Kirby: I have shipped honey to Montreal, putting 24 in a case with handle on each side. In putting the cover on I attach it so that it is right close down on the covers of the pails.

Mr. Armstrong: The case I have been using for the last 15 years is similar to what Mr. Chrysler uses. I want a solid bottom in every case to send out with

extracted honey. There are too many nail holes knocked in the bottoms of the tins where there is not a solid bottom. I always put a hand hole in each end of the case so that a person will never take hold of it in any other way. I have found the cases that contain six satisfactory in every way and I never had any complaint. I make the bottoms out of 3/8-inch and the ends out of 7/8-inch stuff.

MR. PETTIT: I think this idea of Mr. Newton's as to soap boxes is a good one. I have used it in making crates for comb as well as extracted honey. These boxes are accumulating in the basement of every grocery store and they are shipped away by the carload; and if the dealer knows you will take them regularly, especially if you are his customer, you will get them very cheaply. I used to get them in the fall and work them over in the workshop in the winter time to whatever shape is wanted.

Q.—*How small a nucleus can be used to successfully make queens from?*

MR. MILLER: Two ordinary sections will do it very nicely, but I use a small-sized frame, that is 5 3/8 x 18, and if I wish to leave the queen in till she breeds up I add another frame.

ADDRESS OF WELCOME.

MR. W. H. PUGSLEY, Richmond Hill, Ex-Warden of the County of York, in delivering an address of welcome said, in part: I am sure it gives me great pleasure to welcome the bee-keepers at this their annual meeting, and I am sure they will derive a great deal of benefit from meeting together. There is a great deal of benefit to be derived from this kind of meeting, and whilst I am not a bee-keeper, it gives me great pleasure, on behalf of the County of York, to welcome you, and I hope you will have a successful meeting.

This welcome was ably seconded by Mr. J. D. EVANS.

THE SUCCESSFUL COUNTY ASSOCIATION.

E. T. BAINARD, LAMBETH.

As the successful bee-keeper looks after the individual wants of each colony of bees, so should the successful county or district bee-keepers' association look after and interest its individual members in the advancement of the work of the association.

When a bee-keeper joins the Middlesex Association, which only costs him seventy-five cents per year, we give him the choice of three bee journals, and as we are affiliated with the Ontario Association our members may join for an additional fifty cents and receive the *Canadian Bee Journal* and all reports. This literature is a stimulant to the new member like honey is to a starving colony of bees.

We change the officers each year, working in new blood. Those that have the welfare of the Society at heart, and, of course, the successful bee-keepers have naturally more influence in this work. We hold at least two meetings per year, advertising them well in the local newspapers. By this means we can reach the bee-keeper—if we can call him a bee-keeper—who takes no bee journal.

In looking up the back history of our County Association, I notice about 22 years ago they first affiliated with the Ontario Association, Mr. R. F. Holtermann being at this meeting, explained the benefits of affiliation. Three years ago we asked the Inland Revenue Department that an inspector be sent out. This was done, and every large centre in the Dominion was visited and samples of honey taken and analyzed. The report showed very little adulteration in the Province of Ontario. The tendency of this is to increase the sales of honey and increase the confidence of buyers in Ontario honey.

When we, along with other County Associations, asked the Department of Agriculture for more assistance in fighting foul brood, we were very fortunate in having an inspector appointed for the London district who takes an interest in our Association. He advises the small, the large and the many other classes of bee-keepers whom he visits in his rounds of inspection to attend our meetings, and he generally practises what he preaches by attending himself and giving us information on foul brood matters.

Mr. Pettit: It seems to me this subject of the County Associations is a very important one. The County Associations, rightly managed, are the feeders of the Ontario Association. I made the suggestion a few years ago that the Ontario Association should be considered rather as a federation of county associations; that the county associations, as such, should have a say in the nomination of the directors from their counties or districts; and in this and many other ways the county associations can be of great practical benefit to the Ontario Association as well as to themselves. This practice of giving the members of the Association prizes has worked well in the past, and it seems to me that it would not be a bad scheme to revise that and try something different. We have with us Mr. Nolan, and I think he can tell us of what I consider a very valuable move made by the County Association which he represents this fall; that is, in changing the policy and having demonstrations with bees. We have the means at the College of putting the Secretaries of the County Associations in touch with practically all the bee-keepers in any particular township, or all the townships, if you will, in the district, by a list of the names of the bee-keepers we get from the inspectors' reports, and other means. As was stated this afternoon, it is worth far more to have a thing shown to you than to have it read from a paper. Just along that line, have a demonstration in some good apiary centrally located in the township, and have this meeting arranged for some time perhaps early in June, when it is most convenient, and advertise by a postcard sent to each bee-keeper in the township that on a certain day at a certain man's apiary there will be a demonstration by someone who understands the handling of bees and the treatment of foul brood, and there will be shown, for instance, how to treat bees for foul brood. The inspector goes around and tells each man how to treat foul brood. However, his time is limited. He cannot take time to stop and treat those bees. But if the men of the township could get together on a certain day and be shown there just exactly how to fix the frames and treat the colony to cure foul brood it would be a good thing, and it seems to me it would be very valuable. This is just along the line of what is being done by the drainage advocates, by the orchard people, and many others. We are finding everywhere that the Farmers Institute work and work of this kind must be supplemented by the actual demonstrations, by showing people right in their orchards, or on their farms, or in their apiaries just how to do these things. I throw out as a suggestion what has been done by the Simcoe County Association. These demonstrations in the apiary—try a few of them next year—will, perhaps, be of more value and arouse fully as much interest in the County Associations as

though you simply give your members a bee journal, that perhaps they won't read, or send them some bulletins that they will use to start the kitchen fire with in the morning; because after they have seen a few of these things done they will read the bulletin and journal with a great deal more interest.

MR. D. NOLAN, Newton Robinson: I have been Secretary of the Simcoe County Bee-keepers' Association since it was organized, I think about twelve years ago, and we have on the average about 15 to 20 members a year. Up to the present time those men have been receiving yearly two premiums. We have been charging them since the new regulations with the Ontario Association a fee of one dollar each per year. That affiliated each member. For that dollar they were receiving the *Canadian Bee Journal* as a premium from the Ontario Bee-keepers' Association, and we have been giving some of them the *American Bee Journal;* some the *Review* or *Gleanings;* for the sum of one dollar they received two journals, which would cost them in the regular way something over $2, and they are members of both Associations, and are benefited by that, and our membership never swelled to more than 15 or 20, while I think our county, which is a pretty large county, should have in the neighborhood of one hundred people interested in the keeping of bees. I felt we were not accomplishing very much. When we met twice a year, sometimes we would have ten, fifteen or at the very outside twenty people in attendance, and I thought perhaps it was time to bring about a change. I felt as though we were not getting very far ahead; that we were not, in fact, gaining any ground. I suggested that as our finances were rather running behind it was up to us to try something else. We had with us that day Mr. Pettit. He suggested spending our money for demonstration work that we were spending for periodicals last year—around about $20. So instead of giving the premiums we are going to use that money to the best advantage that we have at our means. We will have as many demonstrations as it is possible for us to have. We are only experimenting. We do not know how it is going to work out or cost, but we are going to try this next year, and we will have one or two or three demonstrations. In a year hence we will be in a better position to report on that.

MR. SIBBALD: I have attended a number of local meetings. I have been to Simcoe and Oxford. I have been to Markham and up to Lindsay, and from the meetings I have attended I have a pretty good idea of how they work out. I have not any doubt but that it would increase the interest and the profit to have a bee-keeper show them exactly how to do things and show them the apparatus and tools that are required to work them out. They ought not to cost too much, especially if they depend somewhat on the Provincial Apiarist to help them. I see, in reading, that in the States they are taking up this demonstration work in conventions very largely. They are finding it very successful. I see that our Brantford people are thinking of taking it up again next spring, and having their meetings held in an apiary near Brantford. I have no doubt that it will be an interesting meeting. People like to see how a certain fellow would do a certain thing, and perhaps you would get a kink there that would help you a whole lot. I know a good many of us learn from reading and from practice, but sometimes someone else has something that is just a little different from anything you ever thought of, and it will save you a lot of work.

Then as to the thought of the Associations being feeders of this Association, I have not the least doubt but that they are. There are two or three things about the by-laws and resolutions that have been passed here in regard to the local associations that I would like to see repealed, and one thing in particular is that there should be a delegate sent from each local association with full powers to speak,

and vote and take part in this meeting and go back to the Association and report. A few years ago they did send delegates here, but somebody said they had not any right to vote or do this and that, unless they paid their dollar, and finally there was a resolution passed that they do not send delegates at all unless they were recognized as full members here. I was sorry to see it passed that way and I would like to see it repealed. Most of the Associations are affiliated now. A few years ago we arranged that the members of the local societies could join this Society by paying fifty cents; I think that has increased the membership of this Association very much.

The Secretary, at the President's request, read a letter from Mr. N. E. France, General Manager of the National Bee-keepers' Association, together with the annual address by the President, Mr. George W. York, at Albany in 1910.

Mr. Herschiser: This address is so full of suggestions of things that the Association and Associations ought to do, that it seems to me almost like a hopeless task to even approach the things that are therein recommended; that is so far as I could see. At that Albany meeting there did not seem to be very much disposition on the part of the people present to discuss it, and it was about to pass; but I protested that it was a paper so full of suggestions that it ought to have discussion. I personally felt unqualified to say very much upon it, as most of the points that were brought out were rather new to me, but I thought there were a good many others in the audience who might be able to offer some good suggestions. Thereafter quite an animated discussion came up, which resulted in the appointment of the committee which drafted the resolutions which you have just heard read. There were two main points in President York's address that appealed to me, one was the marketing of the honey, and the other was the organization of bee-keepers throughout the United States and Canada. Of course, each of these points has quite a bearing on the other; the organization looks to the better marketing of honey, and the better marketing of honey cannot be very well accomplished without organization.

Now, as I have said before, I have not thought upon this subject enough to have anything so very definite to offer. I think the points that Mr. York has brought out there are all very good. I think perhaps in a very crude manner I might say that the plan which appeals most to me would be to have your provincial organization take up the matter of marketing, and have a person employed who will attend to the organization and getting of all the bee-keepers so far as possible into each provincial organization. This organization should take cognizance of the condition of the market throughout the country, and have a crop report similar to what you have now here in Canada. Then have these provincial organizations or the crop committees of the provincial organization report to the national organization, and thereby have the national organization in possession of the knowledge of the crop throughout the country and the crops. That is about as far as I have thought upon the subject of marketing.

As to organization, I think just as Mr. York does, it would be well for the national to employ an efficient agent to go out in the various provinces and try to get more bee-keepers interested in the provincial organizations, and by getting them into the organization they will become better acquainted with the markets and with the value of their goods. A great many bee-keepers know nothing about the value of their goods. They don't know anything about the value of their honey. All their time is spent in producing it, and no thought is given to the marketing of it. They take their goods to the grocery store and probably trade it for a few groceries, and when asked what the price is they

leave the grocery man to set the price. Then after a while a bee-keeper comes along who has taken a good deal of pains in producing a fine grade of honey and ought to have something to do with the setting of the price, and after having conferred with the grocery man he is told the price is so and so, and the only thing he can do is to take it or leave it. When he has a crop of honey on his hands and needs the money, after a while he finds he has got to take that price. That is a big wrong. I have considered it so much a wrong that I have carried over a large crop of honey from year to year determined to get the right price for my honey or keep it. There are a good many people who ought to be interested in raising the price of honey as far as possible, who seem to be trying all the time to keep honey as cheap as possible. I refer particularly to a good many of the commission merchants, and incidentally or indirectly to some of the people who are selling bee-keepers' supplies and handling honey on the side.

Mr. Kirby, Oshawa: Mr. Herschiser speaks of the prices of honey not soaring. One reason is this: Since I have come in the room here I have been told by one of the best oratorical stars of this institution that he has been selling his honey considerably below the price set by the Honey Crop Committee. What is the use of this committee setting the price and some of the leading members going and cutting rates in such a way as that?

Mr. Herschiser: I will plead guilty to having sold my honey a little cheaper this year than the price the committee made, but it was for the reason that my honey was not quite so good as the honey that was bringing the best price. I think it would be wrong on my part to stand out and try to get more than my neighbor who has produced a better article than I have. I think this Crop Committee should, if possible, have power to grade the honey for the bee-keepers, and it would be a great benefit.

After some little further discussion on ways and means, it was moved by Mr. Herschiser, seconded by Mr. Brown, that Messrs. Chrysler, Arthur Laing, and Bowen be a committee, with power to add to their numbers, to make a report on the question of co-operative selling. The motion was adopted.

QUESTION DRAWER.

Q.—*Are Italian bees worse to rob than blacks?*

Mr. Lowey: I never found them so. When there is no honey to be gathered any of them will rob.

Mr. McEvoy: Properly cared for there need not be any robbing at all.

Mr. Herschiser: I think the Italians have the robbing instinct more highly developed than the blacks; and the more of that instinct they have, the better I like them because it means they are looking around for something to store.

Q.—*What is the proper Italian—2, 3 or 4 bands?*

Mr. Timbers: I do not think the bands control it at all. You get an imported queen and I will guarantee you will have queens that will run half black—from yellow to black. I believe the best queens we can get both for working and for everything is from queens imported direct from Itay. I have suggested before that should be one of the features that our Apiarist at the Department should have in hand, that is to get queens direct from Italy and breed them in the apiary at Guelph, and send them out at moderate prices or free from the Department.

MR. HERSCHISER: If Italy is as much in the business of taking in queens from other countries as Canada and the United States, the fact that a queen came from Italy would be no guarantee that it was Italian at all. It may not be generally known that the Italian bee is not a pure race, it is a made up bee of different races. Some of them are rather dark in color and some light; I believe some of them are a mixture between the two.

MR. PETTIT: The point is new to me. Langstroth teaches us in his text book that the Italian race is a pure race and has been for centuries, on account of the fact that Italy is surrounded on three sides by water and on the fourth side by snow-capped mountains, so that wild bees could not get in there, and unless they have imported bees into Italy purposely to mix their race it must be a pure race.

MR. HERSCHISER: My impressions have been obtained from reading, and I got my information, as nearly as I can remember, from Mr. Dadant. I think also Mr. Benton would be able to give you some information on that point.

Q.—*Is there any objection to stimulating with the simplicity feeder fastened at the entrance of a packing case?*

MR. MILLER: I wouldn't suppose a man would want to stimulate now. I would suppose that would mean in the spring. I would think that stimulation in the spring with the packing case on was too early.

MR. MCEVOY: I agree with Mr. Miller, when you feed, feed enough. But don't feed till you get into the gap or period when they have sent forward such a lot of brood, and the flow gives out in fruit bloom, and they are caught with too much brood and no unsealed stores; then it pays to feed.

Q.—*Is it necessary to add anything to the sugar and water, two to one mixture, for feeding for winter?*

MR. MCEVOY: No.

Q.—*What is the best veil to use during the extracting for coolness?*

MR. MCEVOY: None.

MR. MILLER: The modification of the Alexander veil. The veil is made of wire netting.

Q.—*Would you advise removing a comb out of the hive which contains a good deal of pollen before putting into winter quarters?*

MR. MCEVOY: No.

MR. TIMBERS: That would depend on how much there was. When I removed it and fed syrup, those were the best colonies and the colonies that suffered the least.

LESSONS FOR BEGINNERS.

A. DICKSON, LANCASTER.

To begin with, I would give a little advice with regard to starting into the business. I would say go slowly and carefully, for the simple reason that you may get a set-back in wintering, which would discourage you completely. Buy in the spring, not in the fall, and avoid winter loss. If you are in doubt as to whether you are getting a good colony or not take a good man with you. Take for granted the spring has come. Down our way we find that the nice weather begins about the 16th of April. Make sure the weather is nice, and the snow all out of the sod and that the grass on the ground is dry. I advise and practice putting the bees

out at night, making sure that the following day will be a nice day. When morning comes the bees do not run out. If you put them out in the day time when the sun is shining the bees will rush out all in a jump and tumble. I have reversible bottom boards. Your hives require cleaning out in the spring when you put them out. You go out early in the morning before the bees have attempted to come out and you have your helper with you. You pick up your hive; your helper takes the bottom board away and you put a clean one in its place. You go to the next and so on. This saves your bees a lot of cleaning out and gives them a good clean start.

If you come across a hive and you feel it is pretty light, chalk on it "light." If you come across one that is heavy mark it "H." Then go over the yard, examine and equalize the stores, but do not uncap any honey for fear of robbing. If you have not got outside protectors to drop over the colony, take a newspaper, four or five thicknesses, and slip the cover over it. Now you have got all your colonies comfortable. Leave them alone. In the spring, as a rule, the queen starts laying in the centre of the cluster. Now make sure every colony has a queen. If you have got a weak colony and you know the queen is a young queen from last year, laying in good shape, try to build her up by simply taking away whatever surplus comb is there that the bees can not occupy. Crowd them up close and put in a false division, the size and shape exactly of a comb, only slotted. If the colony only occupies about two or three or four combs fill in the dead space with a cushion or something, so that there will not be that vacancy. If I find a colony that is strong occupying six or seven frames without a queen I take the weak colony and the hive and place them side by side and give both a touch of smoke. I take out three combs out of the centre and shake the bees in front and let them run in. Take out the weak colony with a good queen, and put them in there quietly, and after you have got them all in there cover them up and give them a little touch of smoke; it disarranges them and destroys the scent of both colonies. Give them, preferably, a little tobacco smoke. The critical period for beginners and everybody is between apple bloom and white clover. Make sure you are trying to keep the queen breeding right through. I practice a system of feeding. If I find a colony requires an extra supply, that is a comb or so, I give them a comb. Now that is the time you can uncap your comb and put it alongside of the cluster, but if I want to do general feeding, I use a system of feeding outside. An outside feeder that I use is 30 inches long by 2 feet wide; the depth is 3-16ths of an inch, screened. The idea of that is your bees gather on the top and can take the honey away home, and they will not daub. This is ahead of even a float. I have a tank which holds about 60 pounds, with a faucet, and a rubber tube fits onto the end of it. I fill that up in the morning with water and buckwheat honey or granulated sugar dissolved in the proportion of one and a half to two. The honey is let on gradually and it flows all over. You only start a little the first day and the bees get started, then you can regulate your faucet and just simply allow it to flow over enough so that they will take it away. That keeps the queen laying right on.

When your clover begins you have got to have the workers there. The colony that has no honey in the hive is not going to give you the workers. Possibly you have had a good supply of soft maple, dandelion and these other blossoms, and a sudden check, and then they have simply had enough honey to carry through the brood that was hatching. A good queen may leave an enormous amount of brood and no honey, the bees die from starvation, and the bee man thinks he has got foul brood. We have now entered upon the flow, and you have got no combs to start, and I would advise you to use full sheets of foundation. It is expensive, but

it pays. You have a certain idea how much honey is required to produce a pound of wax.

If you want to keep down swarming get on your combs as early as possible. Do not wait till you see your clover in bloom in the field. I get my combs on possibly a week and a half before clover begins to blossom, and the bees will take better care of the combs than you can. Put a sheet of perforated metal on first, and then put on your upper story.

You have got your combs all on and you are busy in your yard and you see a swarm out on the wing. You did not expect any swarming so early. It was likely a colony that superseded its queen. It may be an early swarm with the old queen. I go to the colony and look in and see what is the matter, and if I find there are any cells hatched out, it is a swarm that has been led off by a virgin queen. I shake that swarm into the box in front, leave them in that till night, and I advise the beginner to do as much as he can of his work in the evening an hour or so before sun-down, for the reason he won't be bothered so much with robbers, and the bees are quiet and more tired at night. I put that swarm back with the virgin queen; the cells are all torn out. You can look in in from ten to twelve days and see if that queen is laying. The clover season is coming on and you want to watch carefully when your combs get full of honey. I work on what is called the tiering system, and I want to warn beginners that when you go to extract do not be too eager to extract to get a large quantity, because if you are working for that at the expense of quality you will be a loser. My advice is to allow your comb to be capped from one-half to two-thirds at least. All my hives are duplicates; I have an apparatus that goes right on top and lifts the upper story by turning a crank. I have gone around to 15 or 20 colonies and never used a touch of smoke. The idea of this plan is: this upper story is full, not capped, and if the rush is on, and if you do not raise it there is a certain amount of time lost. There is the crowding of the queen below, there is no room above. You raise this upper story and put on your empty one in between and let that down, and put on your cover and the bees go right to work. They will fill up the empty combs while the upper story is ripening. If the upper story is capped over to the required thing, I use the bee-escape. I would not do without the bee-escape if I had to pay $1.50 or $2 apiece for them. I take off this top story, and I have my helper with me in raising these up and he puts in a little smoke and slips in the escape. When the morning comes my upper supers are all free of bees with very few exceptions. I carry them into my honey room and don't disturb my bees; I use no smoke or brushing.

I have an extracting room where the heat gets up to 110 or 115. I do not pretend to extract these combs till after dinner. The temperature is higher than the temperature of the hive. This principle may not be useful to you, but I have no trouble in extracting honey. The system of brushing the bees off the combs is a good one, but the using of a bee-escape is better. If you can make your work easier in the yard do it every time. Whenever the clover season is over I go to work and strip the whole yard. If a colony has only got five or ten pounds, I leave it. I strip the whole yard so that I can get off all my best white clover before the buckwheat begins.

This last honey you take off, keep it from the rest, because it is not as good, it is thinner. The buckwheat season now is on, and you have only one story on then, as a rule.

Now we come to the close of the season. Here is an important part, the preparing of your colonies for wintering, because your fall preparation means

the success of your business for the next summer. Why? For the reason if your colony is given lots of feed in the fall you will certainly have less feeding to do in the spring. The feeder is the exact size of the hive; is three inches deep, and holds 25 pounds. I loosen my story from my bottom boards. My helper puts the feeder right on the bottom board and I put the hive right on top of the feeder. I have had them take up 25 pounds in one night. You can have a little block that will just fit in the entrance, and you can close it up so that just one bee can get out and in. All this feeding is done a little before dark. Do not attempt to begin feeding through the day, because there is such a confusion and hurry at what they have found that they begin rushing in and out. That attracts their neighbors. But if you feed in the evening it doesn't attract the neighbor.

MR. MCEVOY: Did you ever put straw in that feeder?

MR. DICKSON: No, just a float. The float is the full width and length, slotted only about a quarter or three-eighths apart. The slat I make is so many pieces with another cross piece fastened on, so that you can pack your floats away nicely for the winter. I never put my colonies in with less than 25 pounds; better have more. I have a set of these little platform scales; I have a little hand sleigh, and I can go from hive to hive. If the hive weighs 40 pounds, I add 15 pounds of honey, because I allow 30 pounds for the shell, the combs, the bees; whatever is above 30 pounds is honey. By weighing them there is no guesswork; you know exactly what your colonies have got to go into winter quarters. My cellar is all cemented, floor and outside walls; it is under the house, 24 x 36, and I allow not another thing in that cellar but the bees. Some say my bees winter well alongside of vegetables, etc. I do not approve of it. I have had as many as 350 colonies in the cellar. I do not go into it as extensively as I used to. I put my bees in with nothing but the cotton over the frames or a cushion or blanket. The bottom board is turned upside down for the winter, and it gives them a space in depth of about 1⅜ inches; they are all on a stand close; I never touch them the whole winter.

MR. TIMBERS: Providing the bee cellar is not mouse-proof, how would you prevent a mouse getting into the hive on that system?

MR. DICKSON: I have used strychnine and traps, but in my cellar I am not bothered with mice at all. It all depends on the build of your cellar whether they can get in from the outside.

MISS TREVARROW: Could you use the hive lifting apparatus on the Langstroth hive?

MR. DICKSON: You could, providing you have something you could rest it on. The machine I have could be extended to sit on the ground.

MISS TREVARROW: Could you put it into those hand holes?

MR. DICKSON: Yes.

MR. MCEVOY: How many supers do you use?

MR. DICKSON: I have had on as many as four.

MR. MCEVOY: This apparatus would be stakes and windlass?

MR. DICKSON: Yes. It saves a lot of my work. I also run all my bees into the cellar on a track.

MR. PETTIT: Mr. Dickson must remember he has no foul brood down there. I would advise strongly against feeding honey at all.

MR. DICKSON: Before I started on this plan of feeding I had another way. I filled my combs right in the shop and gave them to the bees. I used a strainer eight inches long, two inches wide and two inches deep, made out of tin not too finely perforated. I open the holes with a shoemaker's awl, if I can get one, and

that allows the honey to drip down in fine streams so that the streams won't touch one another, because if they do it all comes in a big stream. Simply take a comb and pass it back and forward under the streams.

Mr. Atkinson: What better do you claim the feeder is by having it under the hive than above?

Mr. Dickson: The bees take it up quicker and the fumes of whatever you are feeding go right up into the cluster.

Mr. M. B. Holmes, Athens: There are a few items with which I would like to take issue with my friend. Buying bees in the spring, not in the fall. What is he to do with the opportunity that comes of buying a good stock at half price in the fall? As to putting out bees at night, we have found it most excellent in our work as beginners to observe the conditions of the weather, and put our bees out in the early morning, making sure from the weather probabilities that the day is going to be fine. Regarding outside feeding, what are we to do when there is a long continued spell of cold dark weather, days of it, when we could not feed outside? We have found it, as beginners, a very nice and very clean way and a very rapid way of feeding on occasions like that to feed with what is known as the Alexander feeder. It can be done very rapidly, and, of course, we beginners have had experience with it and know what the Alexander feeder means. Then for fall feeding we would go one step further and we would call the standard weight 60 pounds for the hive per colony. The perfect hive we would aim to feed up to that standard which we think would always be safe, and for this purpose we have found the Miller Feeder "a thing of beauty and a joy forever." Then as to arranging in cellars, we have found it well carrying them in on ordinary bottom boards, raising them three-eighths of an inch at the back on a block, which gives them ventilation. In conclusion our friend advises us to take notes. It is a most commendable thing.

CAN A WOMAN RUN AN APIARY?

Miss Ethel Robson, Ilderton.

When Mr. Hodgetts wrote me some time ago, asking me to prepare a paper for the Ontario Bee-keepers' Convention, he suggested the rather grandiloquent title, "A College Girl's Success with Bees." It had an alluring sound, quite like a modern magazine article, but it was scarcely warranted by the facts. Although I have perhaps had the privilege of more educational advantages than most country girls, yet it is as a country girl I come to talk to you to-day, hoping that the story I have to tell may have something in it of incentive or encouragement for other girls, who, like myself, have to find some outlet for their energies.

As for my success, if success only meant the doing each year a little better than the year before, and all the satisfaction which this brings, then I might reasonably claim it. Success, however, always suggests the thought of things accomplished, of finality; and to this I have no claim, for I am only a beginner.

As I debated with myself as to a more suitable subject, I recalled a conversation with Mr. Pettit, in which he had told me that he was often asked by the girls at Guelph if a woman could make a success with bees. It occurred to me that this paper of mine might in some measure at least prove a practical answer to the question; hence the title I have chosen. In preparing my paper, I have endea-

vored to suggest what it is possible for a woman to do, rather than to give information as to how to do it. This, the woman who determines to take up bee-keeping can get from much more authoritative sources. I am not presumptuous enough to suppose that anything I may have to say can be of much value to our experienced bee-keepers. It may, however, help in a small way to open up a field of healthful and remunerative employment for women.

In considering a woman's chance of success in bee-keeping, we have to take into consideration many of the same conditions which confront her in taking up any line of work, other than the one in which she is universally acknowledged pre-eminent, that of home-making. Although economic conditions have altered greatly in the last few years, and women can now demand a fair remuneration for their work, yet as a class we enter into any business activity under a heavy handicap. In the first place, we are not trained for business. We grow up with no well-inculcated sense of responsibility. Then, public opinion does not demand it of us. If a man fails to make good along some line of industrial activity, we put him down as an all-round failure. A woman is judged by a different standard; her business capacity is incidental, and perhaps most important of all, it is only in rare cases that women have families dependent on their economic efforts. As a class we lack the tremendous stimulus of home and wife and children dependent upon us. Handicapped in this way, it is not possible for us to successfully compete with men. I rather think it would be a poor thing for the race if we could. Yet this is no reason for sitting back in helpless idleness while there is a possibility of work to be done. Quite apart from the purely commercial aspect, it is imperative for a woman's happiness that she have some employment that will absorb her energies. Luther says of the human mind, that "It is like the millstone in a mill; put wheat under it and it grinds and crushes the wheat into flour; put nothing under it and it still grinds on and grinds itself away." We have to adjust ourselves to the changing conditions of the last century. Many of the industrial activities that belong almost exclusively to the home, and hence were woman's work, have moved to the factory. The housewife of to-day does not have to be proficient in many things which before were considered essential. Unless, however, something is found to take the place of these activities, the woman of the future runs a great risk of being less broadly educated in the true sense of the word than the woman of the past. This is the age of specialization, and what more fitting than that the woman of to-day should specialize along those lines of work for which she is specially fitted. It will give her a new insight into life, a fuller sense of responsibility, and there is hardly any conceivable factor which would do more towards the building up of the prosperity of the country.

Now, among those employments which offer healthful and remunerative employment to women, bee-keeping—while not the most important—at least offers a wide and almost untried (in this country) field of effort, and as such is certainly worthy of serious consideration.

It was no pre-conceived plan which made a bee-keeper of me. It was one of those things which just happened. As long as I can remember, we had kept a few bees at home. I took no part in their management, but have vivid recollections of wild rushes after my father when the bees were swarming. About ten years ago my father purchased some 65 colonies with the intention of going in almost entirely for bee-keeping. For two seasons we were fairly successful. Then a series of hard winters coupled with poor management, sadly depleted our stock until, in the spring of 1907, we were reduced to 18 colonies, and only about three of these were in good shape. During these years I had helped in the summer

with the bees, and in the winter was attending school in Toronto. I left school ardent to do something for the betterment of the world. The world was perhaps wiser than I, and was not particularly appreciative of my efforts; so somewhat discouraged I undertook to build up our apiary and bring it back to a paying basis, partly because nothing better offered worth leaving home for, partly because I wanted some money, and partly because I desired to prove in some way that I really was some good. And thus I found myself really launched as a bee-keeper. My equipment consisted of a little general knowledge of bees, 18 poor colonies, a good honey-house, an extractor, and a cumbersome quantity of supplies equal to running about 150 colonies. I have kept no account of things, so for the years which follow I have to trust to my memory, and can give you only approximate figures. I must not forget to mention a visit made at this time to the bee-yard of Mr. J. McEwan, of Clandeboy, when he very kindly gave me much good advice and encouragement. That first summer I was able to about double the number of colonies, but only had a small quantity of honey. My spring count, in 1908, was 30 colonies; honey crop, 1,000 pounds; colonies put away for winter, 45. Spring count in 1909, 40; honey harvest, 3,000 pounds; put away for winter, 56 colonies. Spring count in 1910, 55 colonies. Everything promised wonderfully this spring. The bees were in nice condition. However, after the warm weather in March, which brought the bees out unusually early, the succeeding cold seemed to sap their energy. The weather during apple blossom and dandelion was cold and wet, and the bees failed to fill up with brood. Then before they were nearly ready for it, the clover was in bloom. The bass-wood was unusually good, which saved the situation somewhat; but even so, I only had about 1,600 pounds of honey. I had set my heart on increasing to 100 colonies, but when the time came to pack up for winter, I found I had to do a good deal of doubling in order to make them strong enough, as I have found out what I suppose every bee-keeper finds, that it does not pay to winter weak colonies. Much of my profit was also eaten up by the sugar I had to buy for winter stores; as the clover dried up the first week in July, the new colonies were very low in stores, and the old colonies were also nearly all light; but in spite of the apparent discouragement of this year, I feel better satisfied with it than with any yet, as I am beginning at last to feel myself master of the situation. I have had practical experience in increasing, in doubling, in wintering, in queen-rearing and in moving, and feel that I have a good basis for going ahead with. Although the amount of honey taken each year may seem small, it is partly due to the neighborhood, which is rather a poor one. The fall honey flow is hardly sufficient to keep things going; there is not much basswood, and alsike is not grown for seed.

Now, having given this short sketch of just what I have done, what are some of the lessons to be learned? When I speak of bee-keeping to people who know little about bees, they usually exclaim, "But how do you manage about the swarming? Do you hive the bees yourself?" The experienced bee-keeper knows that by proper management, swarming can be almost overcome. The greatest difficulty to my mind is the heavy lifting; and on this account, unless a woman is fairly strong, it would be quite impossible for her to go into bee-keeping on a large scale. Two girls can often work together with advantage. My sister sometimes helps me, and then we have no difficulty in lifting the heaviest hives. The hive-lifting device suggested by some of the members would obviate much of this. Outside of the heavy lifting, there is no work about a bee-yard which a woman of ordinary intelligence ought not to be able to do as well as a man; in fact for the

close attention to detail and the constant watchfulness, a woman ought to be specially fitted; and on these two elements success largely hinges.

Now for some of the advantages for a woman in bee-keeping. In the first place, unlike poultry-raising, all the work can be done in the fine weather. In fact has to be done. Even in the summer, unless during the busiest season, there will be a fair margin of time for other pursuits, and all the winter is free; the work is healthful, taking one into the open air and keeping one constantly in touch with the great world of nature. It will yield a good profit for a comparatively small outlay, the chief capital required being brains and perseverance. Most important of all, the work is interesting, even absorbing. Can you imagine anything more suggestive of peace and contentment than to stand in the midst of a bee-yard, one's own bee-yard, the sun beating down warmly, the air heavy with the fragrance of blossoms, sunshine glinting on flashing wings, and the air full of a steady hum which rises to a subdued roar? Then it is indeed that we know what a goodly thing it is to be alive.

Even for the woman who does not wish to go into bee-keeping on a large scale, it can yet be made, in most localities, the source of quite a little income, especially desirable where there is a large family of girls, as well as providing a wholesome sweet for the table. I have in mind two friends who keep from ten to a dozen hives of bees, which on an average net them about $100 a year. They winter outside and leave the packing around the hives all summer, thus saving themselves much heavy lifting.

There is one thing, which though perhaps not pertinent to the subject, I take great pride in and want to tell you about, and this is my success in moving bees. As I told you, ours is not a good clover locality, and the last two years I have moved altogether about 100 colonies, and have never had an accident, nor have I ever driven a nail. I have a little plan of my own, which I never saw described before. Many of my hive covers were made in two parts, a bevelled top and a frame which fitted down over the hive. I took some of these frames to the shop and had them cut down on the inside about an inch and one-half, then I covered them with light boards and wire netting and tacked a strip of heavy woollen cloth on the inside at one end. The day before I wish to move the bees, I lift the hive off the bottom board and set it into the frame, the opening towards the end with the cloth, and the front of the hive resting on the top of the frame, thus permitting the bees to go in and out freely. I place a piece of burlap over the top of the hive and fasten this down securely with another frame. In the evening or early next morning before the bees are flying, I drop the hive down into the frame and secure all together with a string, thus closing it up securely without any fuss or excitement. The hive is then ready to be moved with perfect safety wherever I please.

This summer I tried a little queen-rearing, following the directions given by Mr. Clark at the last Convention. I did not find that the bees accepted very readily the cells moulded in the rake teeth. However, I think my teeth were too large, and as I did not require a great number of cups, I just cut them out of the hives when I was looking through them. Being a woman, I found a hair-pin a very satisfactory tool to use. It was always convenient, it answered the purpose fairly well for stirring the royal jelly, and for lifting the larvæ and transferring to a new cell it was positively ideal.

I suppose if one followed Mr. Pettit's directions exactly regarding regular inspection of colonies, there would be no danger of swarms issuing with unclipped queens. However, with a woman there are almost certain to be times when the

pressure of household duties will drive the bees into the background. It is very hard for us to take anything quite as seriously as our housework. The time for inspection slips by, and then at an unexpected moment a swarm comes out with a virgin queen. I recall one such occasion; it was a Sunday morning, dull, cold and windy. We had just started out for church when what was my disgust to find a small swarm out at the road. It seemed about to settle, so I told the others to go on while I would stay and watch it. It did not settle, but moved on down the road, I following; then it crossed over into a field. I was almost on the point of giving it up, for I thought it will surely go to the woods, and I shall loose it anyway. However, the desire for holding on to my property as long as possible prevailed, and I was soon rewarded by seeing them settle on the low branch of a small tree. I studied the situation for a few minutes. It seeemd a lot of trouble to go home for something to put them in; besides I wanted to go to church. At last a happy inspiration came. I slipped off a skirt, tied a string around the top, making a bag of it, drew it over the branch, bees and all, fastened the bottom of the skirt at the other side of the swarm, then broke the branch off and started off triumphant. One of the boys was coming to see if he could be of any help, so I sent the bees home with him, while I went to church. But things don't always work out as nicely as this. One day last summer I got a 'phone message from the place where I had my bees that there was a swarm of bees in the tree. I thought they would likely go back, but next morning they were still there; so I started off without my breakfast to put them into a hive. We were holding a big picnic that day, and I greatly grudged the time. One of the men had put a ladder up for me where the swarm had settled. I was not able to hold the swarmer and properly shake the limb, so at last I had to saw the limb off. I thought I had them safely in the hive, when all at once they began to leave it with a rush. By this time I was so tired and cross and hungry that I did not care if I never saw them again, and neither I have.

Now, in conclusion, we are living in a period of wonderful development. Our country is alive as never before. If the women of Ontario would take their proper place in this great nation, they must become capable, well-trained and efficient; not that they may enter into economic competition with men, but that they may be able to know and understand their generation, to have a clear vision of its great ideal, and the power to work towards it.

On motion of Mr. Herschiser, seconded by Dr. Hewitt, Miss Robson was tendered a hearty vote of thanks for the able paper which she had read. Miss Robson expressed her appreciation of the vote of thanks.

THE LARGE EXHIBITIONS AND THE BEE-KEEPER.

Morley Pettit, Provincial Apiarist, O. A. C., Guelph.

This is not a subject to be passed over lightly. It is one which I feel that others might have handled better than myself. The large exhibitions have brought and are capable of bringing great benefit to the bee-keeper. They come under the head of that broad term "Advertising," which has become such a science in the distribution of all produce either mental or material.

It is one thing to produce a good article; it is quite another to let the public know that you have it and to persuade them that they need it. Advertising a

product affects two classes of people. First, those who are to be the consumers; second, others, who produce the same article.

The prospective consumer is shown attractive samples of the article. His attention is directed to it in the case of the exhibitions by an attractive display. Thousands of people who have seen the display from year to year, have become consumers of honey, who would not have thought of it otherwise. President Couse said last year that Toronto is one of the greatest honey consuming cities because of these fairs. Bees are there in observation hives. Perhaps some implements used in the production of honey, such as honey extractors, are shown. In this connection the demonstration of live bees is of value. A colony of bees in a regular working hive fitted for the production of extracted honey or comb honey, is shown to the exhibition visitors. The bees are handled by an expert in a way which causes the amazement of the onlookers, and while attention is drawn by this handling of the bees, the lecturer explains something of the life-history and habits of bees—how they build their combs, how they gather the honey, how they carry it to the hive and store it in the combs, how the honey is taken out of the comb by means of the extractor, how the empty combs are returned to the hive to be refilled. These and many other interesting points of information with reference to honey production, enlighten the prospective consumers and answer many of the questions which arise in their minds.

The displays of honey and bees at the exhibitions are also an education to the many men and women who have a few hives of bees but are not giving them proper attention. There is room for valuable work to be done by competent persons at all the exhibitions right along this line in the matter of treatment of diseases, the proper ripening and handling of honey, the proper method of selling honey, and the necessity for realizing its real market value. All these points in which the small bee-keeper has such a direct influence on the business of the specialist, could be handled in daily lectures at the exhibitions to the great benefit of all honey producers.

These points with reference to the great exhibitions and the bee-keeper have come to me from my experience at the Toronto and London exhibitions during the season just past, and point to some practical propositions in reference to this work. First, it is evident that the great majority of bee-keepers in Ontario do not patronize the exhibitions by setting up displays. We find a few men from year to year, and that number seems to be growing fewer. This is much to be regretted when we consider the great advertising value of this work. I am not prepared to say why this condition has come about or to propose a remedy. I feel that the exhibitors themselves, on the one hand, and the exhibition directors, on the other, having this matter immediately in hand, are in a better position to speak than myself. For my part I must state candidly that, considering the price I have been able to get for honey without exhibiting, the expense of setting up displays, and the prizes which are offered for these displays, I have never felt that it would pay me in dollars and cents to go to the exhibition, although, as a bee-keeper, I am satisfied that I have profited by the work of others. I suppose it is poor policy for me to say this considering the benefit that these displays at the exhibitions are to the honey market. Thousands of people pass in and out and admire the honey, and while they may not buy from the exhibitor because they do not want to be bothered carrying the parcel home, they are far more apt to telephone the grocer for some honey the next day, than though they had not seen this beautiful display of honey or heard the interesting lecture on the habits of bees.

It is to be regretted that there has been some dissatisfaction by some exhibitors with the directors of Toronto Fair, with reference to the location of the space, the arrangement of prizes, etc. I am not prepared to say that there are not two sides to the question. For example, if the honey people paid as many hundred dollars for their space as the candy people, I am sure there would be no discrimination against them in favor of candy. The exhibition directors are hard-headed business men, and the Exhibition is purely a business proposition. We must face this fact and act accordingly. I am not prepared to do more than raise the question, and I do it with a full sense of the fact that it is easier to raise a question than to settle it.

I believe this Association should appoint a commission to investigate the whole matter of showing honey and bees at the Exhibitions, and see if something cannot be done to offer more inducements to bee-keepers to put up displays at the County Fairs as well as at the great Exhibitions. It is true that prices are advancing to a certain extent, but not so rapidly as in other lines of goods. The matter of advertising is one which bee-keepers as a class are neglecting almost entirely. We must be aggressive in this and keep our product to the front.

Now, in reference to the demonstrations of live bees given by myself at Toronto and London. There has been some criticism of the fact that my stand was not located at the entrance of the honey building at Toronto. I may say that I was drawn both ways as it were. It would certainly have been an advertisement to the honey men to have the bees near them, and naturally I would have enjoyed being associated with them. At the same time I was there at the expense of the Ontario Agricultural College, and being offered a favorable stand near the College exhibit, and not having any suitable place near the honey exhibit, I accepted the place offered me.

At the London Exhibition I was the only representative of the College, and was given a good stand at the porch of the building where the honey was. Even then there was no sign on the building to indicate that honey was shown inside.

The interest taken by the public in these demonstrations was great. Crowds gathered from time to time at the Toronto Exhibition and people came back to bring their friends to see the demonstration. At London where there were not so many counter attractions, the people crowded about the cage as far out as they were able to see or hear anything. Children came with their books for Nature Study notes, and people gathered in little knots asking what hour the next demonstration would be. I will now give a demonstration something similar to the one which was repeated from hour to hour at the Exhibitions.

In connection with this paper Mr. Pettit gave a practical demonstration with a hive of bees, showing the educative advertising possibilities in connection with demonstrations at Exhibitions. After a short discussion on the subject of exhibitions of honey and the respective merits of collective and individual exhibits, as well as space allowed by the Directors of the Exhibitions for honey exhibits and the amount of money allowed for prizes, the President stated that he thought all the suggestions which had been made during the discussion had been already taken up by the Directors at their meeting. One way out of the difficulty that was suggested was that the Exhibition Association should devote the money which was now given for prizes for the purpose of putting up a collective exhibit. Another suggestion was that the bee-keepers all over the Province should unite in making one first-class exhibit of honey; and every bee-keeper who had been consulted as to this seemed to be in favor of it.

BEE-KEEPING FOR YOUNG MEN.

Homer Burk, Highland Creek.

The young man of to-day has a great many advantages towards success over the men who have been keeping bees during past years. The older bee-keepers have been experimenting for years and we young men reap the benefit of their labors. We benefit also by getting new ideas every year at the different conventions; by hearing various plans discussed and different methods of work given. When the older men started (many with the old-fashioned box hives) they had not these advantages. Each had to search out the best method for himself and many in their experimenting paid dearly for the lessons learned, while now by the improved hives, and by being able to control swarming, the young man in the business to-day can handle more than four times the amount of bees with less labor and secure a larger crop of honey than he could have done in past years. Many of us know that the bee-keeping business is just in its infancy, owing to the rapid increase in the demand for honey. Never until the past few years has either the Government or the general public recognized what an important business bee-keeping is beginning to be throughout our country. Especially the Government is waking up to the fact that bee-keeping is one of the most promising industries of the future and worthy of its aid in stamping out all bee diseases. The young man, under the new methods, will not now be so easily contented with running one, but will want to expand out by running several yards, as it is a well-known fact that the honey is in the country, and it remains for us to increase our yards and have enough bees to collect it. If we are running for extracted honey we must have plenty of combs, at least three supers for each stock and never extract any honey whatever until it has been well ripened by the bees. By letting our honey get well ripened we will not only have a choice article, but we will soon find a ready market for the same, and those who buy once will want more, and thus we will not only create a larger demand for our honey, but we will also secure better prices. One of the main things to secure a good crop of honey is to have all colonies in strong condition at the time the honey flow starts. In order to do this I know from my own experience that young queens raised the year before will in nearly all cases build up a great deal faster in the spring than the older queens. We must also raise our queens from the best stock we have in our yards and occasionally add some new blood, which is very important. I will here give a few facts as to results obtained by fall feeding in my yard of three hundred and twenty colonies during fall of 1909. On the 1st of October two hundred and eighty colonies contained from fifteen to thirty pounds of honey in the brood chamber and were each fed twenty pounds of sugar syrup, mixed two pounds of sugar to one of water, and twenty colonies that had practically no honey were fed about thirty pounds, while the remaining twenty had plenty of natural stores and were not fed any syrup. Now the results were that all but one stock came through the winter alive, and apparently one seemed as strong as the other when removed from the cellar, but at the beginning of the honey flow ninety per cent of those that had both honey and syrup were boiling over with bees and needed supers, while only sixty per cent. of those that had all honey and no syrup were ready for supers and only twenty-five per cent. of those that had syrup only were ready for supers. I believe that there is nothing better for winter stores than sugar syrup, but when it comes to brood rearing it is not in it with the natural stores and, therefore, in the future I want each colony to go into winter quarters with from twenty to thirty pounds

of honey and about fifteen to twenty-five pounds of sugar syrup, as the old bees seem to have more vitality and bring on the first batch of brood better after being wintered on the syrup than they do if they have had honey alone for winter. I know of no business that will give the young man as good returns as a good, large apiary, but he should not run it as a side line with other business. If he has time to spare and wants more to do let him keep more bees.

MR. LAING: Have you had more than one year's experience where you have noted particularly the effect of feeding them sugar syrup?

MR. BURK: I have experimented with that three different years previous to the last, and four years in my home yard, and noted it particularly. Bees are better on honey every time than on syrup. My plan is to give them enough sugar syrup in the fall and it will keep them through the best part of the winter, and then have them come on the honey about the time of brood rearing.

MR. HERSCHISER: I believe that feeding sugar syrup in certain seasons for a winter food is an excellent plan, especially in seasons like last year, when a great quantity of honey dew was gathered in many localities. I had quite a lot of honey dew in a good many of my hives, and I felt I ought to feed some sugar syrup. I was present at the last convention held here and made some enquiries as to what the effects of honey dew would be upon colonies that had gathered considerable of the substance, and afterwards filled up on buckwheat and golden rod and aster honey. I remember one or two members here said I would lose my bees. I replied that I did not think I would, but that I would tell you this year at this convention what the result would be. The result was that I did not lose the bees, and I never had better results than last winter so far as the wintering was concerned; but I can see that if the winter had lasted much longer I would have lost a good many, because they had consumed the buckwheat and golden rod fall honey and had got just about up to the honey dew, as I could see by the condition of the hives. That simply brings out the point that if the bees have gathered unwholesome stores and they have nothing else to cover it up they are in danger, but if there is sugar syrup or fall honey to cover it up they are practically safe.

DIRECTORS' REPORT, 1910.

The Secretary read the report of the Directors for 1910, as follows:

The membership of the Association is 321. Of this number 172 came in from affiliated Associations and the balance in single subscriptions. The membership this year is 321, as compared with 276 last year. The increase is largely due to a circular sent out early in the year to bee-keepers in the Province.

The affiliated associations with their membership are as follows:

Brant	11 members.	Russell	11 members.
Glengarry	10 "	Simcoe	18 "
Halton	20 "	Victoria	25 "
Middlesex	33 "	York	16 "
Norfolk	18 "		
Oxford	10 "	Total	172 members.

The foul brood inspection was again carried on during the year through the Department. The districts were reorganized and 16 inspectors in all appointed for the Province. The grant was raised to $3,000.

A bulletin entitled "Bee-Keeping in Ontario" was prepared by Morley Pettit, Provincial Apiarist, containing valuable information in regard to this industry, compiled from replies received in response to a circular issued in May of this year. This bulletin contains information in tabulated form and by counties, summarized directly from the statements received on such questions as:

Per cent. winter losses and causes; per cent. cellar wintered and date of removal; per cent. out-door wintered, date of removal from packing, nature of winter stores. Kind of summer honey plants, fall honey plants, crop prospects, etc. This bulletin was sent to all parties interested.

On motion of MR. BYER, seconded by MR. LAING, the reports of the Directors and Treasurer were adopted.

MR. MILLER, as representative of the Association at the London Exposition, said: So far as the Fair Board are concerned, they are very anxious to do what they can, and I think they were well pleased this season with the efforts the bee-keepers made, and they are prepared to do more another year. They are open for suggestions, if the Association would offer any for carrying out the work in this line they would be pleased to receive them. The President of that body this year, particularly, has been very anxious and has done everything he could to assist in carrying out the work.

MR. BROWN, as representative of the Association at the Ottawa Fair, reported as follows: There were five exhibitors of honey at this Fair who contested very keenly, yet in a very kindly way, for the red cards, and the management of the Central Fair do all in their power to encourage honey producers to come forward and exhibit their honey and the products of the apiary.

Mr. Hurley presented the following resolution passed by the Brant Bee-keepers' Association: Moved by MR. JAS. H. SHAVER, Cainsville, seconded by MR. ALEX. TAYLOR, Paris, and carried: "That we request the Ontario Bee-Keepers' Association to take up in convention and if possible to forward the matter of co-operative marketing of honey, and that we appoint our President, Mr. John W. Clark, and the Editor of the *Canadian Bee Journal*, Mr. J. J. Hurley, delegates from this Association to introduce the subject before the Association Convention."

On motion of MR. MCEVOY, seconded by MR. EVANS, the by-law of the Association that the directors elected to office at the end of five years, must retire, was rescinded, notice to this effect having been given at a previous session.

ELECTION OF OFFICERS.

The election of officers was then proceeded with, and resulted as given on page 4.

REPRESENTATIVES TO EXHIBITIONS.

On motion of MR. ATKINSON, Cheapside, seconded by MR. EYRE, Messrs. J. D. Evans and William Couse were appointed representatives to the Toronto Exposition.

On motion of MR. ARMSTRONG, seconded by MR. ATKINSON, Mr. Miller was appointed representative to the Western Fair Association.

On motion of MR. MCLAUGHLIN, seconded by MR. LOWEY, Mr. Brown was appointed representative to the Ottawa Exposition.

QUESTION DRAWER.

Q.—*How and when to move* 80 *colonies about* 100 *yards, wintered on summer stands?*

Mr. McEvoy: Move them when it gets to the beginning of cold weather.

Mr. J. L. Byer, Mount Joy: I thought about the first week in December would be better.

Mr. Edward Trinder, Simcoe: I moved mine back 250 yards, and I never lost a bee this spring.

Mr. Eyre: We moved ours about a quarter of a mile and put them out in the spring, and never lost a bee that we know of.

Mr. Kirby: I have moved odd colonies a short distance in the summer time by chloroforming them into insensibility; they seemed to lose their sense of location.

Q.—*Give the best method for clarifying wax.*

Mr. Miller: I do not think it is necessary to use acid; if the wax is heated carefully and allowed to cool slowly you will have as nice wax as you will in any other way.

Q.—*How should a hive be ventilated to give the desired effect? Is upper or lower ventilation preferable for summer?*

Mr. Kirby: There seems to be various methods; some will ventilate with a very large amount of entrance; some ventilate from the top. I do not use an entrance any higher than three-eighths of an inch. I have never yet given a seven-eighths entrance. I do not think it is necessary. When it is very hot weather I want to cool them down. I shift the honey board forward. Some use quilts. I consider quilts an abomination. I use a thin honey board and that gives them all the ventilation they require.

Mr. James Armstrong, Cheapside: I use a seven-eighths entrance the whole width of the hive, and I have very little trouble in the way of the bees clustering out in hot days. My yard faces the south, and it is very hot and gets no wind from the north and not much from the south and none from the east. I used to be troubled once in a while with the combs melting down, when I had the small entrance, especially with the Jones hive; but since I have used a seven-eighths entrance I have never had any trouble; but if it comes a very hot day I just simply raise the back of the cover and shove a piece under it.

Mr. Dickson: I raise the cover at the back when the sun gets hot in the morning about ten o'clock, with an inch block; the front is down and the back is up, and there is a draught crosswise. Inside of twenty minutes or half an hour the cluster has disappeared. As regards ventilation at the bottom Mr. Pettit gave us a plan last spring: Raise the front of your hive off your bottom board and put in a wedge, inch or seven-eighths down to a feather edge, that gives ventilation and the bees climb up easily.

Mr. Armstrong: The only trouble I see in raising the back is that people often have out apiaries, and you can not always be in the yard, and perhaps the bees are suffering all this time; whereas if you have got a wide entrance you can get over that difficulty.

Mr. Evans: I have a warm yard and I have an entrance an inch deep the whole width of the hive. There is an open space of an inch between the bottom board and lower part of the frame, so that if it is warm, by sliding a block endwise I can make the entrance as large as I like. My cover I think helps to keep my bees cooler. My cover is two straight boards with an inch and a half piece be-

tween them at each end. The advantage of that is in cold weather the lid lies flat on the hive on top of the quilt. I consider a honey board an abomination. Then there is a space of an inch between that and the next part of the lid, and in warm weather the sun does not beat on top of the hive, and the air gets between these two and keeps it cool. It is a flat lid and you can pile them up.

Q.—*What can be done to prevent fruit growers from spraying trees in bloom?*

Mr. Trinder: In Norfolk County this season those men are spraying all the time, it does not matter whether the trees are in bloom or not. Mr. Hodgetts sent me up a lot of bills to post up; I put them up all over, and the fruit growers paid no attention, as a rule. I consulted one of our best lawyers and he said you should have the law changed from "full bloom" to "while they are in bloom."

Mr. Kirby: It is a simple matter for you to put the law in force. Go before a magistrate and lay an information and he will do the rest. If not, go to the County Attorney and if he will not act report it to the Attorney-General.

Mr. Timbers: There should be an amendment to the law.

Q.—*Are apiary inspectors appointed through merit, and has this Association any influence towards getting efficient men?*

Mr. Pettit: I have nothing directly to do with the appointment of the inspectors, but I know the Department has had difficulty in getting good men as inspectors, because we learn some of our best inspectors, from year to year, find they can make more at home than they can by going out and doing inspection work. We are going to try an experiment in the spring. We have a few bright men at the College who are taking a special interest in bees, who have had practical experience with bees, and we are going to give them a good drilling before sending them out. We are going to try two or three of these young men in the spring as assistants to some of our inspectors.

In some cases where it is necessary to simply clean up the yard, let this young man stay and do that work.

Mr. Eyre: I think in some other associations that the Executive has some voice in the recommending of the appointment of efficient officers that do public work, where the appointment is made by the Government, and it works very well. There are many bee men who are not members of the Association living down in our district who find it quite impossible to attend the meetings here though they very much desire to do so, and they do not understand fully what they must do. They imagine that the inspector is expected to visit the different apiaries and assist, not only by an examination of their hives and reporting upon the colonies, but by giving instructions, answering questions, etc. For the amount of money expended I suppose there is a great amount of work done. There is dissatisfaction in our district with regard to that matter of inspection.

The President: I think if you will organize an Association, which you should do, that there are surely three or four men in any local Association that know foul brood. I do not see why every member of a local association should not know foul brood. I think it is the duty of each one of us to show the fellow who does not know it. We have got to take that matter up in a very serious way and let everybody know it.

Mr. Herschiser: That is the great trouble in treating foul brood. I have gone around with the inspectors on our side. We went to see a good many bee-keepers, but I doubt if there was one of them, except one or two specialists, that ever did anything in the way of treating their bees. The trouble is that the inspectors have hard work to do very much in the time that is allotted to them and with the money that is allotted to them. It simply amounts to this, that they go

around and inspect the locality and tell the people how to treat foul brood, and they do not treat it, and it spreads and goes on and on. That is the trouble. What I would recommend would be that the Government send inspectors enough up to the Niagara District and keep them there long enough to clean it up, and the same on the New York State side. If it requires the sacrifice of a few apiaries, then sacrifice those.

Mr. Atkinson: I would have every colony inspected when they cross the border.

Mr. Herschiser: I endorse that statement also. If I brought bees over I would be willing and desirous of having them inspected.

Mr. Kirby: I think it is about time some forceful measures were put into operation to clean this thing out. Burn up everything where they will not take the necessary measures to get over it.

Mr. Pettit: We will never be rid of foul brood until the bee-keepers themselves learn how to treat it and will treat it. The inspectors should be more severe. I think it would be in the interests of the greatest number for the greatest good.

Mr. D. Chalmers, Poole: I have advocated quarantine for the last three years, and I am still of the same opinion. Let the inspectors be sent there, and let the owners of the bees make their choice whether to take the bees to the quarantine station and have them cleaned up or have them burned.

REVIEW OF APIARY INSPECTION FOR 1910.

Morley Pettit, Provincial Apiarist, O. A. C., Guelph.

The first work of the Provincial Apiarist in taking charge of the inspection of apiaries was to get possession of all the inspectors' reports previously received by the Department of Agriculture. These reports dating back to the year 1905, were sent to the office of the Apiculture Department of the Ontario Agricultural College, and filed according to the locations of the apiaries by counties and townships. The 1910 reports which the district inspectors sent to the Department of Agriculture from week to week, were forwarded to this office and filed with the previous reports in the same way. The work of sorting out these thousands of reports was no small matter, but the value of the result can easily be seen. By this system it is possible to find the record of every inspection visit to any particular apiary, also the report of all the inspection work that has been done in any township or county.

The first practical use that was made of this system was in March, 1910, when a list was made out of all apiaries where disease had been reported in recent years. This list was used as a mailing list for sending a circular letter, which was calculated to supplement the work of the local inspectors. The following is a copy of the letter sent to the owners of diseased apiaries:—

March 14th, 1910.

Dear Sir,—I understand from our inspector's reports that you have had, within recent years, foul brood in your apiary. If this is the case, you should be particularly careful to prevent robbing during the warm days between now and summer. All hives where bees have died must be taken indoors, away from all possible robbing. It is not enough to close them, because robbers will often gain an entrance when least expected. All entrances of live colonies should be made quite small, especially where the bees are weak in numbers.

Use every precaution and watchfulness to prevent robbing. Do not under any circumstance leave combs of honey out for the bees to clean up. Any honey you have is likely to contain germs which would scatter disease in your healthy colonies. On account of prevalence of disease in unexpected places throughout the province, it is never wise to feed honey to bees, and where disease is known to exist, it is the worst of folly.

I hope you understand fully the symptoms and cure of foul brood. If so, you can be your own doctor, as the inspector's time is fully occupied with those who do not understand the disease. If not, drop me a card, and a bulletin with description and full instructions will be sent.

The Apiculture Department has been established at the Ontario Agricultural College for the benefit of Ontario Bee Keepers, and we want to help you in every way we can.

(Signed) MORLEY PETTIT,
Provincial Apiarist.

The necessity for this letter was shown by the discussion which has taken place with reference to early versus late inspection of apiaries. The advocates of early inspection claimed that much damage would be done through the early spring robbing out of diseased hives. The objection to early inspection is that the weather is so uncertain that very often the inspector is unable to do any work after having taken an expensive trip; also that diseased hives sometimes do not show symptoms in early spring.

For the actual inspection work the Province was divided into sixteen districts with an inspector resident in each district.

Early in May three Inspectors' Conferences were held, one at London, one at Toronto and one at Brockville, which nearly all of the inspectors attended. It was the privilege of the Provincial Apiarist to take charge of these meetings and make the following address to the inspectors in attendance:—

"The purpose of this meeting is to give inspectors of apiaries a definite statement as to their duties in relation to the Department of Agriculture; also that we may engage in a free discussion, and arrive at a united policy concerning our treatment of diseases of bees, and the men in whose apiaries they are found.

"You have received a letter from the Department of Agriculture, naming the counties in which you are to inspect, and the remuneration you are to receive for your services. You are well aware that our appropriation for this work is limited to $3,000.00. Divide that by 16, the number of districts, and you have about $185.00 for each district.

"You are also aware of the fact that foul brood exists to an alarming extent in practically every county of Ontario west of the Trent Valley, and some east of it. With this in view, and the best interests of our industry at heart, I am sure that each inspector will make the best possible use of the time and money at his disposal for this work. This means that trips will be planned with a view to economy of time and expense. At the same time the work should be very thorough. Each inspector should become familiar with his district as soon as possible. We are able to furnish considerable information to the new inspectors and to those who have new territory, from the reports of past inspection work.

"Our first move in early spring was to send to all owners of diseased apiaries, whose names we had, a circular letter telling them how to care for their bees to prevent the spread of disease in early spring. Men all over Ontario have written to us thanking us for the letter.

"By this and other means the Apiculture Department at the Ontario Agricultural College is endeavoring to make itself useful to the bee-keepers of Ontario.

"You are all, no doubt, aware of the work we are taking up in connection with the Experimental Union.

"As you go about amongst bee-keepers, you represent the Department of Agriculture, and should be loyal to all it is undertaking for the advancement of bee-keepers. You will be asked a great many questions about the work in apiculture which is being done at the College. We cannot hope that all our efforts will meet the unqualified approval of all bee-keepers, possibly not all the inspectors; but we are open for suggestions, and reserve the right to use them as we think fit. I have here copies of the circular of instructions which has been sent out to those who are taking the co-operative experiment, and, would ask you to study them fully and make any criticisms you have to us at the College, and not to the bee-keepers in your district.

"In addition to the co-operative experiment, we are gathering statistics of bee-keeping in Ontario, and getting it in the shape of a card index, arranged by counties and townships. We cannot tell how great the value of these records will be, but they have been of much use to us already.

"I need not dwell on the place we occupy in the College curriculum. All of the first year students receive a course of 25 lectures in apiculture.

"The matter which I feel could be taken up very soon, is the "short course in bee-keeping." I was hoping that Ontario would lead in this, but I find that Massachusetts Agricultural College is holding an apiculture short course from May 25th to June 8th this year.

"During the month of June we have undertaken, along with other work, to give demonstrations and lectures every day to the excursionists.

"I have taken up the matter of the College work at some length, so that you will be able to answer the questions of any bee-keepers who may wish to know what is being done.

"I would like to say a few words with reference to your reports of inspection work. It is important that you secure all the information asked for in the report. It is costing us days of labor to hunt out and fill in the names of the townships in the reports of inspectors who have been careless in this respect. We are unable, of course, to learn the concession and lot, and for the direction of future inspectors this information is very valuable, and would have cost practically nothing if it had been done at the right time. In the case of cities and towns be sure to give street and number when there is no concession and lot to give. For example, when an inspector comes into a city and has the name of a dozen bee-keepers, it will save him a whole lot of time if he is able to go directly to the street and number without having to make a number of enquiries.

"It is also understood that reports of inspection are to be mailed to the Department of Agriculture, at Toronto, at the end of every week. It is quite necessary that this be attended to. Only one apiary should be reported on each report blank, and in the case of a second or third visit to the apiary, a special report should be made of each in the same way. Try to be brief and to the point in these reports. Simple statements of the number of hives of live bees in the apiary, the number examined for disease, and the number diseased, stating whether E. F. B. or A. F. B., the treatment ordered, and success of former treatment Also give a word or two with reference to the condition of the apiary, such as fair or good, or excellent condition, or careless, or whatever adjective will best describe the management of the apiary.

"I hope that we shall have a good discussion on the management of special cases.

"We have to deal with a serious proposition in the matter of disease in Ontario. As was stated at first, American foul brood is very prevalent. A new

problem which we have on hand is European foul brood, which has done so much damage in the United States. I cannot see any reason why we should escape. It is impossible to cure it in an apiary of black bees. When we know how common black bees are in Ontario, scarcely anything more need be said. With this in view, we should urge the use of Italian bees with all the eloquence we can command.

"After the Trenton District, the next point we know of is in the counties of Lincoln and Welland. We know now of a case of some 25 hives moved over from Buffalo to Fort Erie. I inspected them and found them infected with E.F.B. I was also informed that bees on the American side all along the river were infected with this dread disease. We are looking after this territory carefully and will inspect it thoroughly as soon as possible."

These Inspectors' Conferences proved to be very valuable, good points in management of both men and disease were brought out by some of the older inspectors, greatly to the benefit of the younger men in the work.

Owing to the lateness of the spring the inspection season opened rather late.

The following are the reports by districts:—

No. 1. Bruce and Huron. Inspector J. S. Schrank, Port Elgin.

"In speaking of that portion of my territory, Bruce County, I might say that until these last three or four years it has had very little attention, notwithstanding the fact that there is perhaps no county in Ontario where the possibilities for a good honey production are better. Consequently foul brood has gained great headway there and the loss has been great, many apiaries having been entirely wiped out, with the owners too much discouraged to start again. Now, however, since they have the protection of the Government and understand the disease and the motive of the law, in that respect, they are gaining fresh courage as well as appreciation of the methods the Government has adopted, and I find many who have once kept bees and lost them through disease starting again.

"I think the present method of the Government a good one, if the inspectors do their duty.

"Apiaries visited, 76; hives in apiaries, 2,318; hives examined, 920; number colonies diseased, 108."

No. 2. Waterloo and Perth. Inspector D. Chalmers, Poole.

"On account of the cold spring I did not commence inspecting until June 18th, and failed to get out after July 15th. I inspected 68 apiaries and found foul brood in 18. The total number of colonies in the apiaries inspected was 453; of these I inspected 164, and found 22½ per cent diseased."

Mr. Chalmers expresses his appreciation of the revision of the Foul Brood Act, whereby owners can be compelled to transfer bees out of hives with combs which are not movable. He makes the following suggestions: —

1st. That an Act be passed prohibiting the sowing of buckwheat before July. He says when we consider the damage done our white honey crop by the buckwheat mixture, and the profit it would be to the grower not to sow till then, as the bees would work stronger on it and thereby assure a better crop, it would be just as reasonable as forbidding the spraying of fruit trees before a certain time.

2nd. That there be an Act passed compelling cider mill owners to return their pomace with those getting cider made, instead of dumping it out where it would be a damage to bees.

3rd. That the Association should devise some means of having extracted honey inspected, as he finds too many extracting before the honey is ripe.

4th. That a quarantine station be established in each township where the inspector would order the owner of diseased bees to take them on a certain day and also to go for them when notified. At said station the bees would be treated by the inspector or some competent person.

No. 3. Wellington and Grey. Inspector Jno. Artley, Blantyre.

"I found American foul brood very prevalent in some sections; in the vicinity of Guelph, Wellington County, and in the Beaver Valley, Grey County, especially.

"The greatest source of contagion is the bee-keeper with one or two colonies who doesn't know the first thing about bees. In a lot of places the bees were all dead, but I kept no account of them. I can suggest no better plan than the Department of Agriculture has adopted. Inspected 96 apiaries containing 3,260 colonies, of which 578 colonies were diseased. I think I should have a longer period of time."

In addition to the inspector's report, we have the following valuable communication from the former inspector, Mr. Alpaugh:

"As for the annual loss caused by foul brood disease I can hardly say, but if all the sections in the counties of Wellington and Grey are as bad as the ones I visited, I would put the loss for those two counties alone at $60,000. I visited a good many sections where some bee-keepers had lost upwards of 100 colonies; that, at the present crops and prices, would mean $1,000 each annually. Those were parties who did not start up again as they felt there was no use as long as the disease existed so close to them."

No. 4. Lambton, Kent and Essex. Inspector W. A. Chrysler, Chatham.

"I have been out for only twelve days this season, but I looked up as much as possible, new infected districts.

"I visited 42 apiaries containing 595 colonies, of which I found 150 colonies diseased. It is very noticeable in those that have the disease, their bees are greatly reduced in numbers to what they would have had. There is, however, a great indifference among many about trying to cure, and also in others inability to follow instructions.

"As regards the financial loss caused by the disease of foul brood in bees in the counties I have inspected; I am only estimating it as I found it in the different localities and the loss is estimated for the year that I inspected it. The loss yearly in bees I estimate at from $700 to $800, and about the same loss in honey.

"The present plan adopted by the Government is advisable in my opinion until the territory is once covered by the inspector. After that he should not inspect without being asked for by the bee-keepers themselves. Foul brood, if left alone in certain localities, will destroy itself as effectually and as satisfactorily and at as small a cost in some instances, as an inspector could do it, especially where bee-keepers are not well informed and are not making or trying to make money out of bee-keeping. I consider the most effectual way and probably the speediest way of destroying foul brood throughout Ontario, and cheaper in the end, is for the Department to instruct inspectors to have every diseased colony that was not destroyed, shipped to some central place for treatment or destruction, and that the owners receive a small compensation.

"Of the foul brood I have located 90 per cent can be traced back about fifteen to twenty years, and these are the localities that did not rot out like some others."

No. 5. Middlesex and Elgin. Inspector John Newton, Thamesford.

"On account of the very bad spring for handling bees, then becoming very busy all at once and sickness in our home, I was unable to do my work justice, but for all, I do not think there was anything that suffered. I found on the whole that foul brood was not so prevalent as in 1909. I find one great drawback to stopping the spread of disease, and that is bee-keepers will move bees from place to place without permission of the inspector. (I mean those that have had disease in their yards). You know nothing about them till after they are placed for some time alongside of some clean yard. This should not be so. This season I have only been out 9 days visiting 30 yards, with a total of 1,572 colonies. Out of a total of 651 hives examined 15 cases were discovered in six yards, two of which were new cases. I found five yards that had disease in last season this season free from disease. I feel that the bee-keepers in general are taking more interest in their bees and doing their best to keep them clean.

"I have always maintained that honey from diseased yards should not be placed on the market for retail trade. In some way it should be sold to manufacturers who would use it up and destroy the vessels that contained it. It is clear to me that there is more disease around the larger centres, and I lay it to honey being retailed and vessels being thrown out into the garbage heap for the bees to feed upon."

No. 6. Norfolk, Haldimand and Welland. Inspector James Armstrong, Cheapside.

"Of 820 colonies inspected, there were 71 diseased. Of 44 apiaries inspected there were 15 infected with Foul Brood. At Fort Erie village, 41 colonies had European Foul Brood; 1 yard of 14 colonies was treated, and I found them all clean on my second call. Others had promised to clean up, but owing to only limited time I was unable to find out if they had done as they agreed.

"This is one great drawback, the Inspector's time being limited, as in this case it will have to remain until next spring before it can be seen if they cleaned it up.

"Six apiaries in the neighborhood of the smelter at Thorold were completely wiped out, and according to this and what the people said I am perfectly satisfied that the damage was caused by the smelter. Mr. William Hoover, one-half mile from the smelter, got two colonies of bees this spring, and when I examined them the brood was dying.

"There should be an Act passed that all bees coming into the country should be inspected. The officer at the port of entry could notify the Department, and the Department could notify the Inspector into whose district the bees were going, so that they could be inspected and the diseased ones destroyed or sent back."

No. 7. Oxford and Brant. Inspector Wm. Bayless, Grand View.

"I would not like to estimate the loss by diseases of bees, and as to method of preventing the loss by same; think possibly a tax on bees would help some; for where a successful bee-keeper makes a home people in the neighborhood think all

they have got to do is to get some bees and they will have a gold mine in their own yard. They do not look after them, and if anybody has an old hive or comb they will do anything to get it, sooner than pay for some good foundation; the result is loss and danger to all the bee-keepers in that part."

No. 8. Wentworth and Lincoln. Inspector Alex. Robertson, Waterdown.

Mr. Robertson went to British Columbia for the winter and was unable to report.

No. 9. Halton, Peel and Dufferin. Inspector Arthur Adamson, Erindale.

"There are a great many farmers, who keep a few bees, that need educating along these lines. I find a great many, in fact the most of them, very anxious to learn. In my mind it would be a good idea to have meetings through the country during the winter and get these people interested. I think it would assist the inspector also in his work.

"One apiary that I inspected in the town of Oakville, late in the summer, was badly diseased, evidently caused by diseased honey brought into the town. There being no disease near, this is the only way I can account for it.

"Number of days inspecting, 18; number of apiaries inspected, 71; number of apiaries diseased, 25; number of colonies diseased, 105; number of colonies inspected, 2,414."

In addition to the inspector's report, we have the following valuable communication from H. G. Sibbald, the former inspector:

"I do not think that Foul Brood is on the increase in the district allotted to me for inspection work in 1908 and 1909. What I deplore is that many, most of those once having the disease amongst their bees, fail to entirely eradicate it. It keeps breaking out again and again. The financial loss is hard to figure out. It takes time for each bee-keeper whose bees are diseased slightly to watch for it—time to cure, time to melt wax, disinfect, etc. There is also the almost total loss of the colony treated for that season. If there are 300 infected colonies each season, the honey loss would be $1,500, and time quite as much more.

"Requiring a 'certificate of health' before selling bees or moving them from one district to another would do good.

"The best suggestion I could make as to the carrying out of the inspection work would be to have the inspectors burn more and have the provisions of the act more rigidly enforced. My own experience with the disease leads me to the conviction that the sudden death cure is the only sure cure and the cheapest in the end. Why try to cure so anxiously when increase can be gotten so easily from sound, clean stock."

No. 10. Simcoe and Muskoka. Inspector Hy. Johnson, Craighurst.

"I visited 113 apiaries, and found that 23 of them had diseased colonies. The number of hives in apiaries visited were 2,153, total hives examined 1,197, total number of hives diseased were 141. Destroyed 12 hives not worth cleaning up. I found that a good many people had made sales which had Foul Brood. In some cases I told the man to move the bees back and clean up at once. I only went to

one neighborhood where I wasn't called and found Foul Brood there. I visited every apiary from the time I left home until I got back. I found one hive of A.F.B. in Muskoka. The apiaries are very scattered in Muskoka. Since the season was over I have heard of other localities where Foul Brood is.

No. 11. Ontario, York, Victoria and Durham. Inspector J. L. Byer, Mount Joy.

"The season was so very unfavorable in the early part that little work was done at that time. About fourteen days were put in; only places that I was requested to visit received any attention. No attempt at systematic work was attempted—indeed, such a thing was out of the question. Nearly all requests were attended to, but little revisiting was done in September. Foul Brood is under control and nearly wiped out of Victoria county I believe. Durham had but little of the disease. Ontario county has, generally speaking, not very much disease, and what I know of is pretty well under control. One exception to this statement is a tract of country north and west of Uxbridge town—everything has about rotted down there and no apiaries worthy of the name are left. York county has lots of the disease—some in almost every part of the county.

"Number of apiaries visited 48, number of colonies 782, number examine 568, number diseased 103."

No. 12. Peterborough, Northumberland, Hastings and Prince Edward. Inspector W. Scott, Wooler.

"I travelled over the same ground as last year. I found that all the bees had been treated, except one apiary, but very little Italianizing had been done, consequently the European Foul Brood returned in every apiary and destroyed some of them completely. I found the disease spreading very rapidly; it has more than doubled since last year. The disease now covers fully 400 square miles; besides two outbreaks in Prince Edward County, also two in Hastings county, one in Roden township, and one in Huntingdon township. I think if the Department could encourage the beekeepers to Italianize ahead of the disease, it would prevent a great deal of loss, as the disease does not affect the Italians nearly so badly as the blacks. I think the spread of the disease could be prevented some, if the law would forbid the moving of bees except by permission of the inspector. I found three cases, in the past season, where the disease has broken out, caused by the moving of bees from a diseased territory to an uninfected one. Had this moving been prevented, it would have taken it probably two years to travel of its own accord.

"I may say that $5,000 is not too large an estimate for the loss sustained by disease in my district last year, but these figures will be greatly increased next year, as European Foul Brood is spreading very rapidly. Last year (1909) it covered about 100 square miles. At the present date it covers 400 square miles, besides an outbreak in Prince Edward county; also in Hastings county, near Ivanhoe."

No. 13. Lennox and Addington, Frontenac and Leeds. Inspector J. B. Checkley, Linden Bank.

Reports that he found an apiary which had been reported diseased last year and which the owner had refused to treat. This year there was no disease present and the 12 colonies had increased to 41, and yielded a large surplus of honey.

Mr. Checkley found many beekeepers who did not supply water and salt to their bees. This negligence he considers a fruitful source of disease. He reports that this has been a banner year in his district.

No. 14. Renfrew, Lanark and Carleton. Inspector R. J. Stead, Lanark.

"The following is my report for 1910: I worked as Inspector of Apiaries for 24 days. During that time I inspected 87 apiaries, containing 2,093 hives. I found European Foul Brood in 16 apiaries, and in 181 hives. Almost all the Foul Brood I found was in the townships of Gloucester and Fitzroy, and the city of Ottawa and the town of Arnprior. I told the parties having Foul Brood that I would visit them again to see that my instructions were followed out, but I did not have time to do so.

"I consider the financial loss caused by European Foul Brood will amount to $2,000 in the territory I have inspected this summer, and I have only been over about half of my territory. I would suggest that an Act be passed compelling every person keeping bees to take out an annual license, the money so derived to go towards paying for the loss of diseased bees and hives destroyed by the inspectors, and have the inspectors destroy all infected black bees and badly infected Italians."

No. 15. Russell, Prescott and Glengarry. Inspector Alex. Dickson, Lancaster.

"I found my territory free of the disease, but at the same time my advice is to continue the inspection work. It is surprising how glad they are, as a rule, to have their bees inspected. My territory is very large. I should be allowed more time to give the work justice. From the following figures given, it will give you an idea of my work: Number of colonies 5,225, number examined by me 1,348. With only five or six exceptions all had them in frame hives. The inspector of this territory should be allowed at least 28 or 30 days."

No. 16. Grenville, Dundas and Stormont. Inspector Homer Burke, Tayside.

"I put in only two days' work this year, and I visited the sections where the Foul Brood was the season before. The year before I visited nearly all sections in my district and found no disease. Now what we want is to stamp the disease clean out of the Province, and as we only have so much money for inspection work I think we should use most of it in the sections where it is needed most. I do not know of any better plan for stamping the disease out than what the Department is now taking, only spend most where it is needed most."

Mr. Pettit: Points to be noted are:—

1. Indifference, ignorance and carelessness which might be overcome by education, short courses and more particularly apiary demonstrations.

2. The suggestion to tax or license beekeepers. I have maintained for some years that bees should pay taxes like any other property.

3. More rigid enforcement of the Act.

4. Inspection of bees coming into the country.

Any honey in the brood chamber is liable at any time to come into the super during the breeding season. I know this because any dark honey being in the

brood chamber is liable to darken the honey in the supers, and on this account any honey in a diseased apiary is liable to contain the germs of the disease, and honey in a diseased apiary should not get back to the bees again if it can possibly be avoided.

One of our inspectors brought out this fact, that colonies which he knew to be visited in the fall showed no disease early in the spring, and a few weeks later they showed the disease.

The question of these terms, American and European Foul Brood, has been raised in the sessions here. It is unfortunate that there is a slight mix up of these terms. The legislation which we have refers to Foul Brood instead of two diseases of bees, as it should; it is the same with the legislation in the different States of the Union. With this in view, and to get as near a uniformity of terms as possible, the authorities at Washington decided on these terms: the bacillus which causes the old-fashioned foul brood was recently discovered by White of Washington and named *bacillus larvae*. That is recognized now as the cause of American foul brood. Being discovered by an American it was given that name. The term European foul brood is given to the other disease, the origin of which is still in doubt. There is no doubt but what it is a germ disease, but it is not definitely proven what germ really causes it, but it is known to-day that when Cheshire and some of these men in Europe were investigating foul brood and talking about *bacillus alvei* that they were really investigating black brood, or what is now called European foul brood instead of the disease we have been troubled with. The most of these terms have now been established by scientists, and I think we will get over with the confusion quickest by simply accepting the terms: American foul brood, the diseased condition caused by *bacillus larvae*, and European foul brood, which has been called by some black brood, which is new in some sections of Ontario.

As to inability to follow instructions, the way to get at that would be by a number of demonstrations; if they can't do it after that we will have to try a little fire. It will be necessary for our inspectors to be a little more severe in some cases where the disease lingers around year after year, where the man is too busy, as was mentioned in one case; the inspector goes there and shows him the disease and leaves him for a month and then goes back and it has not been attended to, and the disease has had just that much longer to spread. When he goes back again perhaps he tells him again. When he goes back the seocnd time, if he sizes up the situation as being a man that is not going to follow instructions, there should be something done with some of the worst colonies in the yard, make a bonfire of them. The news of the bonfire would go over the neighborhood far better than any ordering or jawing on the part of the inspector.

These cases of foul brood that can be traced back fifteen or twenty years should have had more severe treatment ten or fifteen years ago. Now, I know how hard it is to go to your neighbor or the man you have met and talked with and inspected his bees, haul him up before a magistrate and fine him for breaking the law, and yet what are you going to do: There are a number of cases where the man has the disease, and has been shown the disease the year before by the inspector, and he knows it is contrary to the law to move those bees without permission of the inspector and will go ahead and move them. Is there really any difference between that and breaking the law in some other way?

I may say that we are after the three European foul brood districts especially, and next year we hope to send in plenty of assistance with the inspectors in

these districts so as to be sure and check the spread of that disease if it possibly can be done. At the same time we see that Italianizing must be attended to, and that seems to be the only salvation.

The Ottawa district has quite a number of small beekeepers and a lot of box hives. They have considerable European foul brood, and good bee-keepers can go in there and do something as soon as this disease is under control.

Mr. Herschiser: I want to offer a word of encouragement to the specialists. I had this disease break out in my apiary in Buffalo just about the time it broke out in the other apiaries around, so I was obliged to treat an apiary of about 56 colonies that wintered there. I treated all but ten in that yard last summer. I gave them very thorough treatment. They were pretty good Italians, most of them, some of them dark and a few of the colonies nearly black, and from the fact that I treated so many you know I had a pretty good dose of black brood there. I think I have realized just about $5 a colony out of the apiary this summer, and I have lost no ground in it. In fact I am just one ahead of what I was a year ago. I lost down to 52 during the cold weather in the spring, and I have increased from 52 to 59, and I have got about 1,800 pounds of honey and a large quantity of wax from melting up old combs. The greatest loss I sustained in the yard is that it took a whole lot of time, not having any previous experience in treating foul brood; the whole subject was new to me. I want to say generally in the eastern part of New York State a large number of apiaries were almost entirely wiped out. A great many of the bee-keepers who had suffered great loss about twelve years ago have now good producing apiaries; but, I think, as Mr. Pettit has pointed out it is necessary to Italianize. It is really a fact that the Italians are almost immune. You get a real good quality of Italians and they will clean up the disease.

Mr. Byer: I am extremely glad that all the members have come to the decision that there is such a thing known as black brood or European foul brood. I make this prophecy to-night that in five years from now American foul brood will, in our conventions, be hardly thought of at all; we will be studying how to combat European foul brood all over the Province. You will see as much difference between chilled brood and starved brood and European foul brood as there is between day and night. I was down in Albany, and I made it a point to interview the largest producers of New York State, the Coggshalls, and everyone without exception said the American foul brood is not in it with European foul brood.

MAY WE CO-OPERATE FURTHER IN SELLING THAN THROUGH THE CROP REPORT.

W. Couse, Streetsville.

It is a fact that there is no one person seems to get along without somebody giving assistance in some way or other. Our ideas have been for a long time to get together and discuss what we can do to improve the markets for honey. A number of years ago co-operation was the talk. It was impossible to get a co-operative body in a business way together. It dropped, and the Crop Report Committee was formed. The Honey Crop Report and the co-operative matter that I may have something to say on are almost the same thing. I can only give you a few headings, which all seem to show co-operation.

Now, in the first place, with a person who has an apiary, his first idea, once he has got his honey, is to sell it. Can you do it yourself, or are you going to get somebody to help you? That is the question. If you are going to sell it right at home, and only have a little, you may do it; if you have an apiary of 150 to 200 colonies you have to get somebody to help you, and who are you going to get? The first person is yourself, to do all you possibly can. Your next position is this, to get your grocer to help you. Therefore, do all you possibly can to increase the home demand before there is any freight attached to it, which amounts to a good deal. This can be done to a greater extent than the majority of people think. If a man produces a good quality of honey, and he gets a man to take ten pounds of honey to start him, and it suits him very well, a family of five or six will not be long in consuming it. I have a customer who yearly comes and gets twenty to sixty pounds of honey. The greatest feature possibly in creating a market is having an excellent article. If a man can get 50 customers and get them a little bit interested in eating honey, they will eat up all he can produce. If you have not the time to retail, you have to get your grocer to help you out. Give your grocer honey, and keep him well supplied all the while. He is co-operating with you to sell your crop if he is given a profit on it. I feel that is the starting point in what we call co-operation.

If you have sufficient honey you may go the next step, which may be the wholesale grocer. I have driven to Toronto many times with five or six hundred pounds of honey; I have given the grocers half a dozen pounds, and I have sold honey in Toronto to the druggists. When I first started selling honey in Toronto, I think it is perhaps twenty-nine years ago, it was only the druggists who bought honey. It kept working along until the grocers began to buy it. We used to get it into the larger grocers, and now almost every wholesale house is handling honey in Toronto.

I had an enquiry from a firm that wanted to start in the honey business. I said, I will help you to find out where there is honey. If you like I will take stock with you and be willing to buy honey and see it is right, to get you going, for every person you can get interested in honey helps you out. There is what you call co-operation going a little farther. There seems to be a tendency for everybody in the food product business to handle honey. This is another source of selling honey. Further than that, if you are really in a neighborhood such as many of you are in, you can co-operate with your fellow bee-keepers. Now, why not all get together and ship your honey to some wholesale firm in the West and have it all cleaned up in that way? Why cannot every section do this? That is co-operating in every sense, and there is no doubt so far as we are concerned we are pretty well relieved; we are not fretting very much about the markets. Remember, we are in a good section for good honey.

There is no doubt at all so far as the Honey Exchange Committee is concerned that in one sense that is co-operation. They do not try to sell for you; they simply tell you what they think you ought to get for your honey. You would be surprised to find how that report is respected by the wholesalers; they do not like it. So that in a great many ways we are co-operating.

Now, there is still another way we might co-operate. This present season the Government sent fruit to the Old Country, and have been extremely successful. They have taken fruit from three or four individuals and have made it profitable for these persons to send fruit to the Old Country. The fact of the matter is that there was a considerable amount of fruit sent, which relieved the home market. Providing we would do something in the same way it would relieve the market here.

Above all, we must have quality. I have simply given you hints of what we might do. I made up my mind when I was informed of these channels, which would be possibly open to us if we would ask for them, I would do something. We have always been able to do that. In connection with the Colonial Exhibition, held in London a few years ago, there were almost 40,000 pounds of honey sent over; every bee-keeper that sent it took his chance, but remember we got 10 cents a pound for it. At the time of the Pan-American Exhibition we did the same thing, and we got our 10 cents.

MR. E. GRAINGER, Deer Park: In regard to the last suggestion of the speaker, I may say there has been a little done in the way of sending honey to England. While at the show in the fall a representative of the Dominion Government had me put up an exhibit—one for Liverpool, another for London—so that Canadian honey to some extent at least is on exhibition in the two cities named. The idea was to put it up in such a way that it would be attractive, and they thought the way it was put up at the exhibition would attract attention if it was so displayed in England. They asked for instructions to be sent and they were carried out, and they are putting it up in pyramids the same as we have it here displayed at our exhibitions. I was careful to send a very fine sample, so that the Canadian honey that is on exhibition there would be a credit to the bee-keepers of Canada.

MR. CHRYSLER: This has only been done in odd years and at odd times. In making an exhibit in any foreign country or in any exhibition we must follow that up in order to reap the benefit, and we would be glad to hear from anybody who has any suggestions along that line, in coming to some definite plan by which we can continue along this line.

MR. P. W. HODGETTS, Secretary: I have here a letter from our agent in London.

October, 18th, 1910.

DEAR MR. HODGETTS.—Enclosed please find copy of letter received from Mr. Watson, of the office of the High Commissioner for Canada, City Trade Branch. We notice your name as Secretary-Treasurer of the Ontario Bee-Keepers' Association for 1910, and trust you will be able to give the information required.

We have been writing to you frequently lately and trust the matters we have placed before your notice do not take up too much of your time.

Respectfully yours,

N. B. COLCOCK.

DEAR SIR,—Could you kindly indicate the addresses of any Ontario producers of honey who are shipping supplies to the United Kingdom at the present time?

We have an enquiry from a firm wishing to obtain quotations for Canadian honey, and although we know that small shipments have been made to the United Kingdom from time to time, we do not seem to possess any addresses of the actual shippers, although the writer understands that Messrs. Goold, Shapley & Muir, of Brantford, interested themselves in the matter some years ago.

Yours faithfully,

HARRISON WATSON.

MR. HODGETTS: I went out to supper to-night with Dr. Hewitt. He has only been in the country about a year, and took his position at Ottawa quite recently He was talking about the same matter we mentioned yesterday. I think it was that we ought to pay more attention to our Western Market rather than the English Market. He stated to-night that the English market is open to the whole world, and that honey is coming in from the South Sea Islands, from the Indies

and from other places where labor is very cheap, and where if they get two or three cents a pound for their honey they are quite satisfied. He doesn't think the price of honey in the Old Country market would pay us to ship it there as long as we are able to get the prices we are now getting in Ontario and the West. His advice is to get after the Western market for all we are worth, and try to hold that market from the inroads of the cheaper Western American honey which now I believe is practically controlling all the British Columbia markets, and is coming into the Western Provinces of Manitoba, Alberta and Saskatchewan, just the same way as Western fruits are coming into this Province.

Mr. Kirby: This importation of foreign honey is going to be quite a serious impediment to the bee-keepers of the Province of Ontario. This morning I went into a wholesale place, and the manager told me he used about sixty tons of honey annually. He said, "We import nearly all of it; we get some from Jamaica and some from California, and we can get that honey laid down here for less than 8c. a pound." I think something ought to be done toward getting the duty on honey raised, to get the tariff up on honey, the same as other industries have done throughout the country.

Mr. Chrysler: I may say that such honey practically does not compete with ours. It is not a table honey, it is a honey from the Indies; it is fit only for manufacturing purposes, and I think the raising of the duty would hamper the manufacturers to a great extent. I think we had better leave the duty alone, and not say anything about it. We have got superior honey for the table in our country; let us get to work to market that to the best advantage.

Mr. McEvoy: The best co-operation in the world is a choice article.

Mr. Dickson: That is why we are selling so much honey on the market to-day throughout Ontario. I tried the experiment possibly as early as anybody in sending it to the Old Country, twenty-seven years ago. It was not a success; I never tried it again. Next year, if I am spared, I and my brother are going to co-operate together in the West.

Mr. Nolan: With reference to the Western market, personally I have had a good deal of experience in selling honey there. For the last few years I have sent the bulk of my honey there, and some years I have not had enough. I am making a living out of bee-keeping like the rest of you. We have a growing country there; we have a great market there; and the people of the West, if we produce a good article, are the class of people who are prepared to pay a good price. Now, I think there is one point about co-operation in getting our honey to the West that is worth considering, and that is, the difference in shipping honey in small and large quantities. If we can ship honey to the West in car lots by the lake and rail route I think we get a rate of about 75c. to 80c. per hundred, and shipping in small lots I think the rate to the same points would run from about $2 to $2.25 a hundred. There is a margin of profit there to us that is worthy of great consideration. It will almost pay a man in the West to handle the honey on that basis alone. On every ton there will be a profit of from twenty to thirty dollars. There is a limit to everything. The other day a firm there wanted about one thousand pounds of honey if I could give them that honey at a price they could retail it at 15c. a pound in five and ten pound tins. I could not accept that order, because there was a cent a pound difference between what they could pay me, and pay the freight and have that honey laid down and sell it at the profit they wished to have, at 15c. If that honey could be laid down in car lots, there wouldn't be any reason why I could not have had that trade. The Western country is not at a standstill. I do not think it is necessary to look for any market in any other direction than

there. Not only in the West, but in Northern Ontario and New Ontario, and this vast country out there, where they will not be producing honey or fruit, they have got to have something, and I do not think we can offer them anything better than honey.

REPORT OF SPECIAL COMMITTEE *RE* CO-OPERATION.

Mr. Bowen presented and read the report of the Special Committee *re* Co-operation with Regard to the Sale of Honey.

After discussion as to the details in connection with the forming of a Co-operative Association or Joint Stock Company, following the lines of the report presented, it was suggested by Mr. F. P. Adams, Brantford, that the committee appointed take a year to perfect their plans, and come before the Association at the next annual meeting with a clear-cut proposition, something which the members would be able to vote upon intelligently.

Mr. Adams moved, seconded by Mr. Byer, that the Committee be granted $50 from the Association for the purpose of enabling them to form themselves into a provisional directorate for the purpose of taking out a charter, and report at the next annual meeting of the Association.

This motion was put to the Association and adopted.

Mr. Trinder moved, seconded by Mr. Laing, that whereas the present law of Ontario prohibits the spraying of trees while in full bloom, and as there is much doubt as to the interpretation of the law owing to the use of the word "full," therefore be it resolved that the attention of the Minister of Agriculture of the Province of Ontario be directed to this matter, with a view to having the law amended so as to read "while in bloom," and that they be requested to have this change made as aforesaid. (Carried.)

REPORT OF HONEY EXCHANGE COMMITTEE.

Mr. Sibbald presented the report of the Honey Exchange Committee as follows:

There are a few things I might say about our Crop Committee that might help the work along in the next year. There are always some complaints made as to the time we hold our meeting. Some claim we hold it too early and some claim we hold it too late, and I do not know but what that is a pretty good sign that we hold it about the right time. Some parts of the Province are earlier than others, and we cannot get over that in any way I know of. I cannot see any way out of it, unless we hold two meetings. Last year we held a meeting about the 2nd or 3rd of August, and the members of the Committee were all present excepting Mr. Craig. Mr. Craig wrote and made a number of suggestions as to his impression of the crop and probable prices. Four or five prominent bee-keepers happened to be in the city, and we heard about it, and got them over the 'phone. and called them in to help us a little. We had more reports than ever before, which goes to show that the bee-keepers are supporting and appreciating the work of the Committee. We regret that some bee-keepers do not fill up both columns in the report; that is, give the report for the year before as well as the report for the present year. That helps us in this way; we add up the amount

of this year's crop and the number of colonies kept by each bee-keeper this year, and then we divide that and get the average per colony, as per the reports of this year; then we add up last year's report in the next column, that should give 1909, and then add up the number of colonies kept that year, and we get the average for the year. That is about as near as we can come to the difference between the two years. Some large bee-keeper may report this year, and for some reason does not report for next year, and there is where our difficulty comes in. We could take our report this year, say fifty pounds to the colony, and then take the average next year and compare them, but the way we have been taking it, it seems to me is a little more accurate, if we could get some bee-keepers to give us their report for last year again with their next year's report.

Another thing I want to mention. I have felt a little disappointed when we do not get a report from some prominent bee-keepers who attend our meetings each year and take an interest in all we do. I do not know whether it is because they have anything personal against the Committee, but we do not know really why every bee-keeper who takes an interest in this report should not send in a report. The reports have always been confidential. It helps wonderfully to get an accurate idea of the crop for the present season. We have often said at our meeting if a man has a poor report we do not hear from him; if he has a good report, we get it. There is a tendency amongst us all to tell about a good thing and keep the other quiet. If we do not hear about the failures and low crops, and hear only all about big ones, it has a tendency to make us think there is more honey and a better crop than there really is. So that your report is just as important if you have not any honey as it would be if you had a good crop. Do not forget that another year. Mr. Hodgetts, the Secretary, has mailed the names of the bee-keepers who have a quantity of honey to sell to all the largest dealers, so that they can write to the members personally, and that has resulted, I believe, in a number of sales being made. The large dealers are very anxious to have our reports, and some of them I believe have joined the Association to be sure to get them.

A short discussion ensued upon the report, the concensus of opinion being that the Crop Committee were holding their meetings and getting out their report at about the right time of year, and were doing the best they could under existing conditions to deal fairly with the members of the Association.

On the motion of Mr. Byer, seconded by Mr. McEvoy, the report was adopted.

Mr. Evans moved, seconded by Mr. Herschiser, that the Honey Crop Committee be reappointed for the year 1911. (Carried.)

Mr. Pettit moved, seconded by Mr. Chrysler, that the Honey Show Committee be re-appointed for 1911. (Carried.)

Mr. Pettit moved, seconded by Mr. Chisholm, that the Transportation Committee be re-appointed for 1911. (Carried.)

Mr. Sibbald moved, seconded by Mr. Dickson, that the place and date for the holding of the next annual meeting be left with the Executive Committee to decide. (Carried.)

The Chairman called on Mr. J. J. Hurley, Brantford, to address the Association with reference to the resolution adopted by the Brant County Bee-Keepers' Association.

CO-OPERATIVE HONEY EXCHANGE.

J. J. Hurley, Brantford.

Mr. Hurley: I have been commissioned by the Brant Association to speak to you on the matter of co-operation. The question of co-operation is looming up and becoming a very important one. It had its origin in Great Britain, where the working men have established retail stores, and having made a success of this, went into the wholesale business and thus into the labor co-partnership business until their activities are running them into the millions. The movement has come to Canada. The farmers are taking hold of it and with great success; they are cutting out the profits of the middle man. The Fruit Growers and Apple Growers of Norfolk county got the inspiration from a man of some brains and some organizing capacity, and he got them together and pointed out to them that they were at the mercy of the man who came along and offered them so much a barrel for their apples. The fruit growers in those days were only getting one dollar a barrel. To-day, as the result of organized efforts on the part of the Norfolk Apple Growers, they are handling their own apples. They are putting them on the market themselves. They have built a large building in which to store them, and the apples are brought in by different farmers or fruit-growers. Every barrel is labeled with the producer's name or initials; is put in storage, and it is sold by one appointed for that purpose. The result is they are getting from 400 to 500 per cent. more for their apples than formerly. They are getting from five to six dollars a barrel. They have proved the success of co-operation. It seems to me the same can be done by the honey growers of Ontario. It is unfortunate that this Association is so divided; I think if we would get together and decide to drop our difficulties, and have a little more confidence in each other, and work together for each others mutual interest, and co-operate together with the idea that we are going to help ourselves and help the other fellow, we can get together and make this Association of some benefit and use to the honey growers of this Province and of Canada. The price of honey fluctuates a great deal. We have a variance of from three to four cents in a pound of honey. Now, if we had an organization that would be called the Ontario Honey Exchange for instance, which would advertise itself and make it known that it was handling the honey crop of this Province, and send out circulars to the West and to the Old Land, if necessary, and to the grocers throughout the country, and tell them we have honey for sale, and that we can make consignments in any quantity and put it up in any way that they desire, and quote the price and make the price standard, which is the great object, we will succeed in obtaining a standardization for the price of honey. Wheat will sell in the city of Toronto for the same price it will sell away back in the back townships; it will sell in the European markets, and men will get a certain price for their wheat on the board here the same as in the Old Country. The price is practically universal, it will vary but a few cents, possibly, and that only from the time the market changes until the information reaches the farther-most point. If you succeed in organizing something of this kind to standardize the price of honey you will have somewhat the same conditions they have in the wheat market. While, there is only a variation of from two to four cents, possibly five cents in 60 pounds of wheat, which is selling at somewhere around one dollar, you have a like variation in one pound of honey. Just think of it, you have a variation of two or three, or possibly four cents, sometimes

in one pound of honey, while the variation in wheat is only four or five cents in 60 pounds. That is the result of standardization. I am sure it must commend itself to you that there ought to be an effort made whereby a condition of affairs can be established that your honey will be standardized, that a pound of honey is worth so much money. Mr. Herschiser, very ably pointed out at Albany that a pound of honey will not to-day buy the same amount of butter or eggs, or cheese or bacon that it would ten years ago. Everything has advanced in price but honey, and, therefore, there ought to be some organized attempt to improve this condition of affairs. The first step will be to organize a business proposition. The only way it can be done is to organize a joint stock company under the Ontario Companies Act, and secure a charter for $10. The ordinary joint stock company, as we know it in the business world pays about $100 for a charter, but the Ontario Government has made it easy for co-operative movements of this kind, and they grant a charter for $10. I know the General Secretary of the Co-operative Movement in Brantford. He took the matter up with the Ontario Government sometime ago, and succeeded in getting their assent to reduce the cost of incorporating co-operative concerns, and the result was that he succeeded in getting the amount reduced from $100 to $10. If you organize and issue stock—and you have got to do it in a businesslike way, and induce every bee-keeper throughout the province to take stock in this co-operative enterprise—and sell your shares for $5, the smallest, the most humble bee-keeper could give you $5 and become connected with this Association. Some could take more, but have the amount of stock that any one man can buy, limited, in order to prevent any one man controlling the institution, because the idea must be kept forward, that it is a co-operative movement, and the humblest man who sells you only 100 pounds of honey is going to share in its benefits equally with the man who gives you $10,000. I am presenting to you the real co-operative idea, or trying to. Capital has only a fixed earning value in interest, and therefore, those of you who will take shares in this co-operative movement can expect only a fixed dividend, whatever may be decided upon. The co-operative movement of Great Britain is based upon this plan, that capital is entitled to only a fair interest, and they have fixed it at 5 per cent. There are great loans made in Great Britain as low as three per cent., but they claim capital is entitled to an earning power of 5 per cent., and that is what they pay. Everything over this goes into the institutions as profits. Everything that is earned over and above expenses is profits, and those profits are returnable to all who are parties to the co-operation, in the form of dividends upon their purchase. In your case the profits that this institution would make, would be returnable to every man who consigned his honey to you. That would make the matter a true co-operative scheme. It will not do for you to organize a simple joint stock company, and then go out and buy honey all over the province as low as you can, and sell it as high as you can: that would not be co-operation. But, remember, if you start this movement you must make up your minds to the idea of co-operation, that the humblest man is co-operating with you in consigning to you his honey, and is going to reap a benefit because he is co-operating with you, and that idea must be kept forward and pressed forward and hammered into the minds of the honey producers, that it will in time show good results; and I have no doubt if you start this in a small way and allow it to develop, that in five years you will have a honey exchange established in the province of Ontario, that would be known on two continents. Then, if an English man wanted honey, all he would have to do, would be write to the Ontario Honey Exchange at Toronto or Brantford, or wherever it was located; he would thus be in correspondence with your business

managers. Your business manager could say, "We have so many pounds of honey which we can consign." You would be in touch with the markets of the West, and you could talk car-loads, whereas now, the individual man is simply talking a few hundred or thousand pounds. I would say, concentrate your efforts in a selling scheme, which would permit you to put your honey on the market in a business-like way. Mr. White, who has recently come from the Old Country, tells me there is a market in the Old Country for such honey as is produced in Ontario. He tells me that we are producing in Ontario the finest honey he has ever seen upon the markets in England. The Britisher is a man who wants a choice article. Honey is selling there for 25c. a pound, and you can consign honey f.o.b. cars here for 15c. a pound to the British market, there is no doubt about it; Mr. White tells me it is the case. You need not be afraid of the foreign honey, with which you have to compete. The Britisher distinguishes the good quality, but does not care much how much he pays for it, so long as it is good quality. Those of us who have honey to-day. Mr. Sibbald and those men who are producing large quantities get their price; they are getting 10½ and 11c., and because somebody else sells for 6½, they do not necessarily have to meet that price. These gentlemen know it is more difficult for the individual to handle his honey than for an organization that would be handling the crop. The market is a sort of vacuum, into which this honey is going to be poured. If you control 50 or 75 per cent. of the honey crop of Ontario, it is manifest that no matter what the other fellows sell their honey for the people who want good honey must come to you. You have got absolute control of the market, and you can then sell your honey at a price that will yield good profit to the producer and will permit your co-operative scheme to work profitably. If you start on a small scale and work it successfully for a year or two the smaller bee-keepers will become educated to the fact, that it is a protection to them, a benefit to them, and you will by the simple process of education secure the support and co-operation of all the smaller bee-keepers throughout the Province. First you want a charter, then you want to get out stock sheets and take subscriptions for stock and make a call upon the stock of 25 to 50 per cent. for the time being, and get the thing going. Secure some business man, not necessarily a honey producer, a man with business experience, a man who knows something about the markets. There are such men; Toronto is full of them. You could go to some wholesale grocery and put your hand on some bright young man, who is employed now, and tell him to take the management of this concern, give him a book-keeper and stenographer and tell him to get into communication with all the grocery stores throughout the province of Ontario, Manitoba, and so on. Advertise it thoroughly, and give people to understand that there is a honey emporium situated in Ontario, where they could secure their honey with the quality guaranteed, and then let it be honey that the different bee-keepers consign to that place. Have a good storage room, and let that man sell it out. As to the quality, every man shipping his honey in, whether in a barrel or ten pound tins, it should bear upon it a mark that would identify the seller and if, when the honey is sold, there is any complaint about it it can be brought right back to the man who sold it. Each man co-operating should be known by a number: let him put that number upon his package. That package goes into the general store house, and it is at once identified. it comes from number so and so: the books show who that man is. The honey is shipped out, and if there is any protest comes back that the quality of that honey is not as guaranteed, you consult the number on that tin and you can go right back and put your hand upon the dealer. If a producer is not putting up a good article, if he is adulterating it you can spot him in an instant. If you succeed in

making some profit, let this profit be returned to the man who has supplied you with the honey. That is the true idea of co-operation. The men who have supplied you with the honey must share equally, according to the amount they have consigned to you, so that it will be perfectly equitable and just in the distribution of it, so far as that will go to each and all of you. The humblest man will share in direct ratio to the man who is selling you 10,000 pounds. Then the board of directors would have it in their power to decide that for the first year or the second year dividends would not be paid, but rather reserved in order that you would have more financial strength to undertake greater things next year. In that way your capital would grow, and it would be the property of all participating, and the Association could go on. If there are 2,000 bee-keepers in Ontario, who would subscribe $5 each, there is $10,000. I contend if you only raise $5,000, you could launch this scheme. If you launch this scheme with a capital of $5,000 in your hands you could finance by the aid of the bank, as much as $50,000 worth of honey. There are large corporations to-day, making a large turn over, who have not the capital to carry them through to the end of the year. Take for instance, the binder twine industry, they have a factory running for twelve months and yet there is but one turn over in a year. You can see they must have an enormous amount of capital, if they are going to finance themselves, but they do not. I know of one that is financed entirely by the bank. They own their property and that is considered by the bank as sufficient security. The bank advances the money on the paper and all notes, and everything that comes in from its agents is assigned to the bank as collateral security, and when the collections are brought in in October and November, all the money is given back and the accounts are adjusted, and the profits are known, and dividends are declared. Now, with a capital of $5,000 you can launch this scheme successfully, and put through a movement that will be for the benefit of all of you, each and everyone, and if you do not enter the scheme with that object in view, do not enter it at all. If you go into this co-operative scheme, you must remember that you must abandon the selfish ideas that you have been working under heretofore; where you rush your honey to the market in order to get ahead of one another. Eliminate the selfish idea, and try to cultivate the altruistic spirit of mutual help, and that is the core of co-operation. Unless you cultivate that you cannot make this scheme a success; but if you keep in mind you are going to help your neighbor equally with yourself, and going to organize something that is going to be a benefit, not only to you, but to the consuming public you will have started along the right lines to make this thing a success.

Supposing you are organized, and are making consignments of honey throughout the province, you could easily get at small cost, fifty or one hundred thousand circulars, and you can there set forth the food value of honey. It is cheaper than butter and a better food, but the people are not educated to these facts. You could put out a lot of circulars educating the people along these lines. A certain number of these circulars could be sent to every grocery man throughout the country, and he could pass those circulars out. In that way you would be educating the people. The whole thing would dovetail, and you would have in a short time the public educated to the value of honey. You would create a greater demand for honey, and have a staple market, a market that you could control; and I, of course, suppose you would control it justly. Ask a fair price for the honey, a price that would be profitable for the producer, but do not attempt to overload the price. Work along these lines, and start this scheme going slowly, and have mutual confidence in one another.

FEEDERS AND BOTTOM BOARD.

By W. A. Chrysler, Chatham.

Allow me to suggest something in regard to feeders and a bottom board. I use what might be called a double bottomed bottom, or floor board, whose floors are about two and one-half inches apart and made of ⅜ inch stuff, let into two side pieces ⅞ inches thick, the same length as the hive and about four inches wide. In the top floor board there is an opening about ⅜ inches wide, by the full width of the bottom board and about equal distance from front to back for the bees to go below, into a feeder, which is made of a piece of paroid, single ply roofing (folded in such a way that it cannot leak), and nailed into what might be called a drawer (without any bottom), that will fit closely and slide in easily, between the two bottoms at the back end of the bottom board. Paroid roofing makes a water tight feeder no trouble from shrinking or swelling, needing no painting.

The opening for the bees is at the front end of the bottom board, between the two bottoms and is two and one-half inches deep, by the full width of the bottom; about four inches in from this opening there is an incline for the bees to run up (through another opening ⅞ inch by the full width), into the hive. When my winter cases are on, they fit down over this entrance and have a small hole near the bottom, which is used as a winter entrance (when wintered outside), which makes it a wind, rain, snow and ice proof, and cannot be clogged with dead bees in winter. When this winter case is removed the entrance is enlarged and if in the very warm weather more ventilation is desired, all there is to do is to draw out the feeder from the back end of the bottom board. This is the most satisfactory bottom board and way of feeding, that I have ever used.

Mr. Dickson spoke of taking off honey with the bee escape. I used to think this was the best way, but there is a system away ahead of bee escapes for speed and labor saving, and I have no use for my escapes now.

Mr. McEvoy: What do you do with the honey from the cappings?

Mr. Chrysler: I sell it. I have a market for that; and a great many people who can't eat other honey, eat the honey from the cappings and prefer it.

THE DISPOSAL OF CAPPINGS.

Morley Pettit, Provincial Apiarist, Guelph.

Mr. Pettit: When this subject was proposed for the convention, the Secretary asked me if I would open the discussion on the rendering of cappings. I took this up last year and mentioned that in my annual report last year, that we were doing some work for the rendering of cappings. I realize the difficulties which Mr. Chrysler has mentioned of separating the honey from the wax cappings without injuring either, and get them separated as economically as possible. There is this other feature in cappings, the refuse or slumgum which adds to the difficulty of separating. Now, this can I have on top is the Behune Capping Melter from Australia. The principle is, it has a double jacket filled with water set on the stove so that the water will be kept hot. These ridges in the top are really tubes, and the hot water and steam fills these tubes as well. As you are working this on the oil stove and the water is hot, and perhaps boiling, the cappings drop on

these tubes and the heat is supposed to melt them at once, and they run through the small spaces between the tubes. The objection I found to this machine was, that the refuse would soon clog these small spaces. If the spaces were larger the cappings would run through before they were liquefied, and right there was the difficulty; to get around that trouble we got after the same idea on a larger scale, and made this other can on the same principle; it has the ridges on the bottom, only they are larger; it is the double jacket principle and it sits on the stove the same, and the hot water fills these ridges right up to the top. Do not understand that I used this machine while uncapping. The cappings go first into a large can with a strainer bottom and are drained, because I want as little of that honey to go through the melting process as possible, and I do not think it is possible to separate honey from cappings by heating, without injuring the honey to a certain extent. It is surprising what a quantity there is still in that. After putting them through this machine the honey is saleable; it goes to the manufacturers at a slightly reduced price, or if you have a local trade and tell the consumer that what he is getting is all right, it makes a fairly good table honey at a slightly reduced price.

Now, the cappings go back in this can and the sides and bottom are hot, and as fast as those cappings touch the sides and bottom there is a melting going on all the time. The liquid honey and wax run down into the channels, between these ridges; these channels are kept open by flat strips of tin, with wires at the sides, which hold them up a little from the bottom. Under this strip will be a three-cornered channel kept perfectly clear of the unmelted matter. In the process it is necessary to keep stirring a little with a long handled knife to keep things moving. The honey runs down the channels and collects and runs on out through the opening at the bottom. I want everything to go out as fast as it is melted. After that melting is done there is next the separating of the honey from the refuse and that from the wax, and you understand that honey being the heaviest will be on the bottom, the refuse next, and the wax on the top. That separating is really the problem; the more heat you can have the faster is melts. In any other capping melter that I have tested, the only escape was at one side, and I found that the unmelted matter would crowd right down against the screen and keep the liquid from getting away.

Now, while the melting is going on, the stove is set high enough so that the outlet can be over this double jacketed can. This can is the one which Mr. Sibbald described in relation to his wax press last year. You will notice the smaller can inside the larger and the hot water jacket all around the outside. The liquid runs into the top and the can being tall, it separates so that with this tap we can every once in awhile, draw off the honey at the bottom, and the wax, and slumgum remains. Some of the wax is run off the surface. We are running clear wax off the surface and honey at the bottom from time to time, all day while we are working on the job. The slumgum mostly remains in there; after it is cooled to a certain extent we drain out what we can of the honey, and there is some honey lost in the slumgum, which has to be got out with the wax press.

Mr. Couse: If cappings are kept any length of time do they get mouldy?

Mr. Chrysler: Which deteriorates, the honey or the wax?

Mr. Couse: Both.

Mr. Galbraith: I have a tank the same as Mr. Chrysler, and when the draining is all done I take and wash the cappings with water and my wife uses that water to make vinegar. If you will get your cappings perfectly dry, there

is no danger of them moulding. It is one of the best articles for vinegar that can be found.

MR. EVANS: What is the objection to melting the cappings in the Solar Extractor? I have an Alpaugh Solar Extractor; the wax is as good as any other wax, but the honey is not as good.

MR. PETTIT: I think the Solar is the best arrangement there is for melting cappings, if you have time to attend to it.

MR. MCEVOY: I used the Solar Extractor, and the honey I got from it you can sell for manufacturing purposes. I mixed it with granulated sugar and fed it in the winter. I took off 1,200 pounds of it this fall. It is perfectly safe.

MR. PETTIT: That might be all right for some careful man that knows he has no foul brood. I believe it should be the policy of this Association to recommend never feeding honey to bees.

MR. ARMSTRONG: I never advise feeding honey under any consideration.

MR. TIMBERS: We should advocate not feeding honey at all.

On motion of Mr. Laing the Convention adjourned *sine die*.

ANNUAL REPORTS

OF THE

Dairymen's Associations

OF THE

PROVINCE OF ONTARIO

1910

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE)

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To the Honourable JOHN MORISON GIBSON, K.C., LL.D., *etc., etc., etc.,*
Lieutenant-Governor of the Province of Ontario.

May it Please your Honour:

I have the pleasure to present herewith for the consideration of your Honour the Report of the Dairymen's Association of Western Ontario for 1910, and the Report of the Dairymen's Association of Eastern Ontario for 1910.

Respectfully submitted,

JAMES S. DUFF,

Minister of Agriculture.

Toronto, 1911.

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DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO

OFFICERS FOR 1911.

President—HENRY GLENDINNING, Manilla.
1st Vice-President—J. H. Singleton, Smith's Falls.
2nd Vice-President—G. A. GILLESPIE, Peterboro'.
Treasurer—JAS. R. ANDERSON, Mountain View.
Secretary—T. A. THOMPSON, Almonte.

Directors:

NELSON STONE, Norham.
WILLETT FARLEY, Canifton.
CHAS. ANDERSON, Overton.
JOSEPH MCGRATH, Mount Chesney.
J. B. WILSON, Gananoque.
J. J. PAYNE, Brinston.
JNO. F. MCGREGOR, Alexandria.
NEIL FRASER, Vankleek Hill.
W. J. JOHNSTON, Eamer's Corners.
W. H. OLMSTEAD, Bearbrook.
ALBERT SCOTT, Pakenham.
EDWARD KIDD, M.P., North Gower.
JAS. A. SANDERSON, Oxford Station.

Auditors:

J. A. KERR, Belleville.
JOHN HYATT, West Lake.

FINANCIAL STATEMENT FOR 1910

RECEIPTS.

Grant, County of Hastings	$200 00
" City of Belleville	200 00
" The Standard Bank	100 00
" Ontario Government	2,500 00
Receipts from 1910 programme	290 00
30% 210—1909 membership—from R. G. Murphy	63 00
394 memberships and 30% of 3 memberships, from R. G. Murphy	394 90
Times Printing Co.	3 50
Cheque returned, rent Picton Hall	5 00
Bank interest, 1909	7 15
Bank interest, 1910	22 80
Receipts from prosecutions	1,419 94
Total	$5,206 29

EXPENDITURES.

Balance due Treasurer, 1909	$65 81
Belleville, Pay Sheet No. 1, Directors' expenses	385 05
Kingston, Pay Sheet No. 2, Directors' expenses	118 75
Brockville, Pay Sheet No. 3, Directors' expenses	52 65
Toronto, Pay Sheet No. 4, Directors' expenses	156 95
Alfred Street, salary for 1910	360 00
Jas Whitton, salary for 1910	360 00
Street & Whitton, expenses, 1910.	395 70
District meeting expenses	342 20
R. G. Murphy, salary for 1910	300 00
R. G. Murphy, postage, telephone, etc.	96 00
R. G. Murphy, presentation	75 00
T. A. Thompson, Secretary, salary for four months	100 00
T. A. Thompson, Secretary, postage, stationery, etc.	134 27
James R. Anderson, Treasurer, salary	100 00
James R. Anderson, Treasurer, postage, telephone, etc.	29 50
James R. Anderson, insurance	15 00
Hy. Glendinning, stationery	3 50
Farm and Dairy, 394 members	275 80
Dairy Herd prizes	145 00
Farm Competition prizes	150 00
Exchange on cheques	75
Wreath, funeral of late Secretary	7 50
Rent of Opera House and decorations, Belleville	101 00
Music, $39.00; Speakers and work for Belleville	163 18
Official stenographer	110 00
Advt. and printing	370 11
Interest on Overdraft and sundry Accounts 655	7 85
Balance on hand	784 72
Total	$5,206 29

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

OFFICERS FOR 1911

President—WILLIAM WADDELL, Stratford.
1st Vice-President—D. A. DEMPSEY, Stratford.
2nd Vice-President—S. R. WALLACE, Burgessville.
3rd Vice-President—W. S. STOCKS, Britton.
Secretary-Treasurer—FRANK HERNS, London.

Directors:

J. N. PAGET, Canboro.
J. J. PARSONS, Jarvis.
J. H. SCOTT, Exeter.
J. B. SMITH, Alton.
S. E. FACEY, Harrietsville.
J. B. MUIR, Ingersoll.

Auditors:

J. A. NELLES, London.
J. C. HEGLER, Ingersoll.

Representatives:

Western Fair, London—I. W. STEINHOFF, Stratford; FRANK HERNS, London.
Canadian National Exhibition, Toronto—ROBT. JOHNSTON, Woodstock; FRANK HERNS, London.

FINANCIAL STATEMENT FOR 1910

RECEIPTS.		EXPENDITURE.	
Cash on hand from previous year	$316 33	Cash paid for prizes, cheese and butter	$360 00
Members' fees	308 00	Dairy herd	96 00
Legislative Grant	2,000 00	Expenses for Convention	150 00
Money received from prosecutions	602 09	Stenographers' salary	464 00
Money borrowed	700 00	Directors' fees and expenses	208 35
Sale of Dairy exhibits	1,948 82	Postage and Stationery	96 45
Advertising in programme	120 10	Printing, $98.26; advertising, $172.36	270 62
		Judges' fees and expenses	44 75
		Lecturer's expenses	206 50
		Prosecutor's salary	360 00
		Prosecutor's expenses	97 50
		Periodicals for members	219 35
		Cost of reporting Convention	75 00
		Paid loan of $700 and interest	703 50
		Refund to members	2 00
		Auditor's fees	13 00
		Purchase of exhibits	1,946 35
		Office light, cleaning and sundries	72 18
		Office furniture	14 40
		Office rent	120 00
		Telegram and telephone	82 83
		Express and cold storage charges	13 33
		Half fine paid to factories	301 00
		Balance on hand	78 14
	$5,995 25	Total	$5,995 25

Dairymen's Association of Eastern Ontario.

ANNUAL MEETING.

The Thirty-fourth Annual Convention of the Dairymen's Association of Eastern Ontario was held in the Town Hall, Perth, Ont., Wednesday, Thursday and Friday, January 4th, 5th, and 6th, 1911.

The hall was handsomely decorated for the meetings of the Association. On the platform was a representation of a harvest field—a large stack of straw ready for the threshing machine in the centre surrounded by sheaves of wheat, oats and barley. The front of the gallery and the walls of the hall were ornamented with sheaves of grain, and from the ceiling in the centre of the hall was suspended a large basket of fruit, flowers and grain, brilliantly illuminated with electric bulbs.

Mr. Henry Glendinning, President of the Association, occupied the chair at the opening meeting, and immediately after calling the meeting to order, delivered his annual address.

PRESIDENT'S ADDRESS.

Henry Glendinning, Manilla.

It is my privilege as President of the Dairymen's Association of Eastern Ontario to welcome you to the thirty-fourth annual convention of this Association in the Town of Perth, which has the proud distinction in dairy circles of having produced the largest cheese made in the history of the world.

That mammoth cheese did much at the World's Fair in Chicago to call the attention of other countries to what we were doing in Canada.

During the months of November and December there were a series of District Dairy meetings held in each county in Eastern Ontario. They were all very largely attended, and a keener interest was manifested by milk producers, factory men and makers than has ever been shown in the history of the Association. The wisdom of the Ontario Government in giving free instruction to all factories and creameries was demonstrated by the uniformly good reports from all of the instructors in the better quality of milk supplied, better factories and improved sanitary conditions in connection therewith, and more uniformity in the work of the makers. All this has resulted in the finest cheese during the past season that has ever left the shores of Canada.

We frequently hear the statement made by farmers, that the cows of ten years ago were on the average better milkers than the cows of the present time. If it be true, we may well ask ourselves the question, Why is this? Some nine or ten years ago a great demand sprang up for stockers to be placed upon the Western ranches. Many farmers crossed their dairy bred cows with bulls of the beef breeds, with a view of producing steers for the Western trade. In this business venture they were disappointed, owing to the fact that they failed to raise a cross-bred calf that would command a price that was remunerative. About one-half of the calves were heifers. These were raised for dairy cows, with the result that they were not equal to their mothers as milkers. For the past five or six years a considerable number of these cross-bred cows are producing milk. A number of

them when fresh calved give a good flow of milk for a couple of months, then they drop off in the milk yield rapidly, which accounts for the low average during the season.

Another cause for low production was two or three dry seasons that prevailed prior to this year, which lessened the amount of feed. The past season has been an improvement in most sections in Eastern Ontario.

During the factory season of 1910, the reports so far as obtained from the instructors show an average increase in production per cow of about twenty per cent. This is very gratifying, but is far below what we expect in the near future. The greatest factor in the increase of milk has been the good pastures that generally prevailed during the season. Another reason for this favorable result was the shortage of feed during the previous three years; this led to weeding out the poorest cows from the herds. This has helped greatly to increase the average milk production per cow. If more systematic work was done along the line of weeding out the poor cows and better feed of the proper kind provided, we would in a few years double the average production per cow.

I believe we are on the eve of a great development in dairying in this country. The work that is being done by the Agricultural Department at Ottawa through the cow testing Associations shows that without increasing the number of cows we might in a short time double our output of milk by breeding, better feeding, and weeding.

We frequently hear of the decline of the dairy business in Canada, and our lessened exports are pointed to as proof of the fact. But all such statements should not be accepted without investigation. The exports of cheese from Montreal for the present year during the season of navigation are 17,000 boxes of cheese ahead of last year. The export of cream to the United States to the end of November last was equivalent to 150,000 boxes of cheese. This should be properly added to our exports for the year. The home consumption of milk, butter, cheese and ice cream is increasing at the rate of over $2,000,000 a year.

There is unfortunately, a tendency to measure the progress of the dairy industry by the export trade. The export trade is only about twenty-five per cent. of our total production of milk. There is now, a very large quantity of both butter and cheese going to the Western Provinces, whereas only a few years ago they were shipping both butter and cheese from these provinces, and they have trebled and quadrupled their output during that time. The home consumption in the East is growing very largely. Such cities as Montreal and Toronto alone require an enormous increase every year to satisfy their needs.

The high price of meats caused our people to turn their attention more to butter and cheese, which they have found to be cheaper and of more value as a food than meat. They also possess the advantage of being always ready for the table as they require no cooking.

Reference to the decline in the Canadian cheese trade by Old Country merchants are often given a wrong interpretation. The impression is given that Canadian trade is declining, because of the increase in the New Zealand imports, while the reverse is true. As a matter of fact, the decline in the exports of Canadian cheese is the thing that encouraged the shipments from New Zealand, and the shipments from that country are just about equal to the decline in the Canadian. I hereby extend the thanks of the Association to the Hon. J. S. Duff, Minister of Agriculture for the Province of Ontario. and the Hon. Sydney Fisher, Minister of Agriculture for the Dominion, for the able assistance they have given the dairy industry of this Province.

THE COW TESTING MOVEMENT.

Senator D. Derbyshire, Brockville.

I congratulate the President upon his address, and I am particularly pleased that our Annual Convention is being held in the old historic town of Perth. It was here, in Riverside factory, owned by Mr. Matheson, that I found our own Mr. Publow, in 1884, and hired him then for instructor. How he has grown since and what great work he has done for dairying in this Province.

We have had a great year. More cheese, butter, and cream than ever in our history. We exported one and a quarter million dollars worth of cream, and our dairy products are three and a quarter millions more than last year. Our whole business has been improved, and still we must continue our work. While a large number of factories have been rebuilt and others improved, still we want all put in first-class shape. Our instructors have done well. I think a large portion of their time should be given to helping the patrons. Some are doing remarkably well. Others show no improvement. The weakest point to-day in dairying is the dairy cow, and the man handling her. I think the instructors would do well to draw attention of the patrons to the cow testing movement, and to explain what is being done.

Mr. S. A. Freeman, of Culloden, Ont., handling a large herd, has the following records of yields of milk:

In 1906,	seventy cows gave an average yield of	5,149 lbs.
In 1907,	seventy cows gave an average yield of	5,871 lbs.
In 1908,	sixty-five cows gave an average yield of	6,211 lbs.
In 1909,	seventy cows gave an average yield of	6,708 lbs.

The yield in 1909, is all the more noticeable as it includes the production of seven 2 year olds; twenty of the best cows averaged 8,724 pounds of milk.

Thus in four years there is an increase of 1,659 pounds of milk, or 32 per cent.

Mr. Freeman expects to reach 8,000 pounds this year. He continued to weed out a few each year and have 2-year olds that he has raised take their place.

Another very noteworthy instance shows a good average almost doubled inside 7 years. Mr. W. E. Thomson, of Woodstock, Ont., states that he has increased the yield of milk from about 5,500 pounds of milk per cow in 1902 to 10,500 pounds in 1909, through using a pure bred sire and selecting the best milkers. He states that the cow testing association records have been a great help to him.

Mr. Thomson writes: "It has always been my practice to raise my own heifers from my best cows, and then to feed and care for them in such a way as to enable them to do the most at the pail. I have only bought four or five since I started into business and they were pure bred cows. The first year I kept records, I sold six to a butcher; these were cows I had bought at farm sales to start with. All cows sold after that were sold as milkers. A cow that will not give seven or eight thousand pounds of milk for me in ten months must go. I hope to have all mature cows give an average of one thousand pounds of milk per month."

Again near Woodstock, Ont., is to be found a most encouraging average and a splendid increase. The herd of 20 cows belonging to Mr. A. J. Davis has been built up from grade Shorthorns of decidedly beef tendency, and the yield has been doubled in 6 years (the average in 1903 was 4,500 pounds of milk per cow, and in 1909 it was 9,144 pounds per cow), by the use of a pure bred dairy sire, selecting the best heifers from year to year, and culling out the poorest cows.

Mr. R. J. Smart, Scotsburn, N.S., gives the following statement regarding his.

1905.

Six cows, from June 17 to September 30, gave 276 pounds of fat worth		$58 19
Six cows, from October 1 to December 31, gave 78 pounds of fat worth		17 92
Total	354	$76 11

1908.

Four cows from May 11, to Sept. 30	405	pounds of fat	$ 96 02
Four cows from Oct. 1, to Dec. 31	135	"	35 29
Total	640		$131 31

1909.

Six cows from May 12, to Sept. 30	620	pounds of fat	$145 30
Six cows from Oct. 1, to Dec. 18	245	"	66 34
Total	865		$211 73

William Paul, of Peterboro, Ont.:

1907, 14 cows average a yield of 4,359 pounds
1908, 12 cows average a yield of 5,218 pounds
1909, 13 cows average a yield of 5,845 pounds
or a gain of 34 per cent. in 3 years.

Mr. Christopher Howson of Keene, Ont., made a gain of 38 per cent. in two years.

T. E. Jory, Lakefield, Ont., shows a gain of 30 per cent. in 3 years.

David Taylor, Warsaw, Ont., shows a gain of 25 per cent. in 3 years, so we want to watch Peterboro' section.

In Brockville section, Frank Sheldon, Oak Leaf, Ont., shows a gain of 22 per cent. in 3 years.

W. J. Curtis, Willetsholme, Ont., shows a gain of 40 per cent. in three years.

I think I have shown sample cases enough from the Report of the Dairy and Cold Storage Commissioners' report to prove to any patron what he should do, and the instructor and cheesemaker are the men to bring this prominently before every man sending milk.

We must get after the dairymen, and influence them to join a cow testing association, weighing the milk, weeding out the poor cows, and getting interested in the business, which would not only have better cows, but would improve the stables, build silos and get right to the front. The men who have taken an active interest in cow testing in the last four years show increases in yield from 13 per cent. to 60 per cent. Now, if we could only make a gain of 10 per cent. we would have ten millions more money. Can we induce the dairymen to take this forward step this year?

Every man of influence who wishes to see our dairy farms prosper should realize the importance of this simple but far reaching plan, and make it a point to recommend the proposition to every farmer in his neighborhood. We should advertise Ontario. The men from the West talk loud about what they are doing, but Ontario has 175,000 farmers whose annual production is two hundred and fifty million dollars, and if we could get them to know what each cow is doing, and weed out each year the poorest and fill the stalls with two-year olds of their own raising; if we could get them to put the stables in good shape having plenty of light and ventilation, silos full of good corn, plenty of water and salt convenient; if we could get them to drain the soil and give it intense cultivation, to select the seed with great care, using nothing but the best, to harvest everything at the proper time and to have it properly protected; if we could get them to use every diligence, to have all their goods taken to the market in the finest condition, in two years we could increase our annual production by five million dollars. We are at the commencement of another year with the greatest prosperity our country has ever seen. Why not surprise the world by putting our shoulders together and making things of this year as never in our history.

I am delighted to be here, and I would love to see the dairymen of Eastern Ontario make one step in advance in 1911, and let the rest of the Province and the whole world know that we are right in this business of cow testing, that we are the men who started it, and that we are leading the way, and that we can do the business better than any one else in the world. We have the finest climate and the best people and everything adapted for making this business go right ahead, and thus increase the buying power of the people of Ontario. Thus we will have better returns and better men behind the business. We sent $1,250,000 worth of cream across the line this year. We still have a lot of ordinary cheese factories that are not what they ought to be, although a lot of new and up-to-date factories have been put up.

COMMITTEES.

The following committees were then appointed:

Nominating: Messrs. Singleton, Kidd and Gillespie.

Resolutions: Messrs. Wilson, Blakely, Sanderson, McGregor and T. H. Thompson.

Legislation: Messrs. Derbyshire, Dargavel, Kidd, McGrath, Stone and G. G. Publow.

Business: Messrs. Payne, Fraser, Olmsted, Anderson, Hume and Farley.

THE CHAIRMAN: I was very much pleased with the remarks of Senator Derbyshire. He emphasized one point and we want to impress it on the powers that be, and that is that the improvement in the dairy business in Eastern Ontario must come from the farm. We found, during the fall of the year, when we held district meetings, that wherever there was an effort made on the part of the farmers to produce a first-class article of milk that there was an improvement, not only in the quality of the cheese, but also in the quantity of the cheese made from the milk. Every section of the country has some few farmers who are not producing milk as they should, and I think the work of the instructors during the season of 1911 should be along the lines of trying to get the farmers to take an interest in producing a better quality of milk. The factories and the makers are in good shape. Some makers may require a little toning up, and some factories a little

repair, but in nearly every factory district there are many farmers who need looking after, and the instructors' work during the coming year will have to be devoted to the farmers.

I will now ask the members present to take up the remainder of the meeting in discussing subjects relative to dairying in a short and concise manner. I will ask Mr. Singleton, the first Vice-President, to open the discussion.

JOHN H. SINGLETON: I am pleased to be here this morning and it makes me feel at home when I look around and see the beautiful decorations that have been put up in the hall. I have attended a great many dairy meetings, but I have never seen anything to equal what we have here to-day, and it ought to inspire us all to a higher opinion of our calling and give us higher ideals in the business in which we are engaged. There are several things that I would like to emphasize in the President's address, and one is that the real need of the dairy business to-day is a larger production of milk from the cows. We do not get enough milk, and the result is that the business is not as remunerative as it should be. When we recollect the attitude assumed in the district dairy meetings we must get more milk from the cows that we have, in order to compete with our competitors, not only here, but on the other side of the ocean; and the best way to do that is for the farmer to raise his own cows. When I was on a farm twenty years ago I thought it was better to go out and buy cows, and I followed that practice for several years, and I was fairly successful. But that time is past and the farmer should now have good cows, and to be successful he must raise his own calves.

I have thought that the Government should, in some way, encourage the bringing in of sires. I believe that is one thing in which we are lacking in this Province. I was struck forcibly with the President's idea of how we came to get into this rut, and that our cows are not as good as they formerly were. I know of some instances, not very far from here, where a beef breeding animal was brought into a dairy section and the result was disastrous in that particular section. They were trying to raise something for beef and something for milk at the same time, and it cannot be done. If we could only get in some good milking strains we would, in a short time, get cows that would be a credit to the Province, and that would fill up the milk pails. I believe there are a lot of good cows that are not given a chance. It is a difficult matter to sell off certain cows and still keep up the herd, and I think the farmers should try and do the best they can with what they have. I believe they could increase the milk production very largely by giving more attention to feeding and caring for the cows. Possibly half the cows in this section are dry at the present time, and it should be the business of the farmer to build up the constitution of that cow and get her in good shape for next spring, and if they would do so they would receive a large increase in the milk supplied, and we hope the farmers of this section will make a supreme effort to have the cows in this section coming up in better condition. If a cow comes out so weak in the spring that she has to lean up against a post to shake herself she cannot do good work.

I am pleased to see that we have another market to send our products to. We have a market in the Old Country that is worth catering to. At the same time I am pleased that another one is opening up for those who are situated along the frontier, and who can send their cream across to the United States to help the people of that country to keep cool in the summer time. They require lots of ice cream, and I believe a market is opening up there for us, the benefits of which we can hardly estimate. It is really remarkable the way the ice-cream business has developed in the United States during the last few years. It takes about

eight on nine millions of cream per year to tide them over the hot weather, and I think there is a brighter outlook for the farmer to-day than ever before. So many avenues are opening up for the man behind the cow, and he is the great factor in this whole business. You may take the best cow and if you put an unskilled man to take care of her, you will not get the best results, and I am glad that the farmers are going to receive more attention this year than ever before from our instructors. But I think you will have to double up the present staff if you are going to accomplish all you expect. We ought to be proud of our instructors and the work they are doing. We cannot afford to have cheese going to Montreal that we are ashamed of, and I hope the instructors will use their skill and ability to help the farmers and encourage them to do better work than they have done, and if this is done I think we have a splendid future before us in the dairy business of Canada.

RECIPROCITY IN DAIRY PRODUCTS.

JOHN HYATT, WEST LAKE.

I have been entertained and have had a good time since I have been here, but I want to talk to you for a few moments in regard to the dairy business of this Province. I want to say that we have had splendid advice with regard to the work of the farmer, but there is a larger issue that has not been talked about very much. I have been advocating it for the past seven years. It is a subject that is of vital importance to the dairymen, and that is the marketing end of agriculture. I venture to say that there are few here within the sound of my voice, whether farmers, dairymen or statesmen, who have stood upon the platform and advocated for one hour the great need of the marketing of the products of the farmer. When we look into the creative power of the farmer it is a wonderful thing. This year $284,000,000 have been produced by the farmers, but when we go to the markets we go as a mere unit to sell that enormous amount of credited wealth. You must remember that the man behind the counter passing out the goods is only an exchange. He is not creating wealth. The created wealth comes from mother earth, and if you will study divine economy you will find out that it is laid upon the agricultural community to feed and clothe the nation. That is not idle talk, it is as true as the light in the sky. These created commodities must be placed upon the market, and the farmer goes as a single unit to sell his products. There he meets the strongest organizations and combines and trusts that the world has ever seen, and that is as true a picture as was ever painted on the canvas of the mind. It is on that that I propose to talk to you for a few moments.

Organization and co-operation are in the air. We had a demonstration of that fact not many weeks ago at Ottawa. My son said to me, "Father, what would you say was the weakness of the farmer that he cannot co-operate?" I said, "Prosperity is one of the most unfortunate things we have got to contend with." He said, "What makes you say that?" I told him that I asked one of the western men who represented thirty thousand farmers from the West, "How is it you people can stand organization?" and he said, "There are two conditions: adversity and six feet of ground makes us all the one size; and the adversity of the West, and the struggle they have had for years with the C. P. R., has made the farmers of the West organize." They were told to glean the wheat better and to cultivate the land better, just as we are told to get better milk and

better cow stables. Talk about your captains of industry, talk about John D. Rockefeller and John P. Morgan. I want to say to you that these men who have come out of tribulation have done greater work and greater things than has ever been done by any of the great captains of industry. Alone on the Western prairie, struggling along, they have handled one-quarter of the wheat this year and placed it on the cars and sent it down to the terminal elevators. They are anxious to have the highest possible standard, and what do they find? That at the terminal elevators they hook number one and number two spouts together and create a grade of grain and send it across the ocean to the English market, and it is sent to one of the mills and tested and from that test they sample all the grain, and at eleven o'clock the cable comes back, and that is the price of the wheat. That price never stops until it gets to the door of the farmer on the prairie, and that is the price he receives. They knew the grain was the best in the world, and yet they keep it down by mixing it. What are we doing about cheese? Take the Belleville section, and this section is perhaps just as good, but in the Belleville and Prince Edward section we are two grades below the English market because our cheese is shipped as Canadian cheese and on that basis it is sold in the Old Land. We think that when it should be graded and sold according to its quality the standard is far superior in some sections to what it is in others.

We need new markets. Fortunately in the revision of the tariff our friends and cousins to the south of us happened to leave a rail off the fence, and in 1907 we shipped to the United States $28 worth of milk and cream, and this year we put one million and a quarter dollars worth over the fence into the American markets. We have a report from nearly all our factories, and it hovers around eighty-four and eighty-five, and the price of cheese in Prince Edward County this year, from spring to fall did not reach eleven cents. Last year at the first board somebody had their ears to the ground and it was said that cheese should not reach eleven and a half cents this year, and it did not reach eleven. If you had gone through what I have, and had been wiped off the face of the earth to the extent of one hundred thousand dollars of business, as I have been; and if you had suffered as I have suffered, you would realize that there is a power behind the throne. What we want are wider markets. I was glad to hear what the President said—that we carried 95 per cent. of the prizes in Chicago against the world. We are proud that we are Canadians, and that we are making such grand cheese. We have the people and the climate and the gray matter under the hat band, and I say we should have free trade with the United States in dairy products. (Applause.) We live in a district where we can almost shake hands with the people over the border, and they were getting 15½ cents and 16 cents when we were getting a little less than 11 cents; and we were selling butter for 24 cents and it was 35 and 40 cents on the other side. We are offering a 10 cent market for a 15 cent market. We are offering a 24 cent butter market for a 35 cent butter market; but we are going to give them the best cheese and butter the world has ever seen and lots of it. I saw by the *Saturday Evening Post* that 70 per cent. of the people in the United States were engaged in pursuits other than farming, and 30,000,000 out of the 90,000,000 in the United States have to feed and clothe the rest of them. Right here, in Ontario, 60 per cent. of the people have gone into other pursuits, and there are only 40 per cent. left to do the work. The other day, I saw one of the brightest boys of the county leaving his farm home and his father, with a broken heart. There are 40,000 less people in the rural sections of the Province of Ontario than there were twenty years ago. There is a reason for all these things, and it is time that the dairymen and the farmers took off their coats and went out into the battle and

fought to the bitter end. It has got to be done. The day has come when we must have these markets. The dignity of Canada and that old flag shall never suffer, but outside of that, let us open out and do business. I am going, therefore, to move a resolution.

Moved by J. W. HYATT, seconded by J. R. ANDERSON, "That the Dominion Government be respectfully but most strongly urged into negotiations, now pending between Canada and the United States to provide for the complete reciprocal free trade between the two countries, in all lines of dairy products."

That is a resolution that I believe will reach the home of every farmer in the land. I believe we ought to have as many markets as possible. I believe that in this Canada of ours we have more natural gifts in nature than they have in any other country in the world, and we have a noble heritage for our people, and that is why I move this resolution, and I invite your attention to it, and I hope you will be good enough to assist me to carry it through to a successful issue. (Applause.)

JAMES R. ANDERSON: I have much pleasure in seconding that resolution.

The farmers of the Province of Ontario are going to do their talking, and the Province will prosper by the farmers taking this stand. The men in the West have been working in their own interest for ten years, and the Western Provinces have prospered by it, and we have got to take the same stand and unite in our own interest.

THE CHAIRMAN: You have heard the resolution, moved and seconded, and it is now properly before the meeting, and it is open for discussion.

MR. SINGLETON: Would it not be wise to refer this to the committee on resolutions, and have it brought in when there is a larger crowd present.

MR. WILSON: Although the number is small, I do not see any reason why we should not vote on this resolution at the present time. As a farmer and cheese manufacturer, I feel a great interest in the dairy industry, and I have listened with considerable pleasure to what has been said along the line of cheaper production and improvement in the quality of the milk. By doing that we will help to bring back returns, but I think there is another thing to do and that is to help widen our markets. I feel that $18 per ton for milk— and in some sections they only pay $16—is not sufficient. When you consider the labor of handling the milk, and notwithstanding that we have made wonderful improvement, the price has not increased, what we need is more markets, and it is up to us to see that when our reports go to Washington that they look after our interests. I firmly believe that if we could get the American market we could secure a better price. There is a tendency among farmers at the present time to raise beef, because it pays better than milk. Reference has been made to the grain growers in the West. They are doing a great work, and I admire the stand they have taken and admire them for their courage, and we should do the same thing, We require special machinery for planting and cultivating corn, and for filling silos and cans and pails and separators. It is simply enormous the amount of manufactured material that is going into the country. No class of people need kick, because they will receive benefit indirectly. I heartily concur with the resolution, and I hope it will pass.

MR. ANDERSON: I would like to say a word or two in support of the resolution. I do not want to see it sidetracked. We should get an expression of opinion from this meeting. I would like to have more present, but I think it should be voted on at this meeting. I have much pleasure in supporting the resolution and hope it will be carried by the convention.

MR. BLAKELY: My eyes were opened this summer as to the benefits of the American market. I heard it stated on Picton board this year that a buyer bought

a large shipment of May cheese, and as he went down to the dock to inspect some of the cheese he said: "I will tell you, but I do not want it noised about—these cheese are bought for the American market." They were put in cold storage for a while and then shipped to the American market, and they paid the 6 cent duty and made more profit than they would have made if shipped to England. And another buyer from Philadelphia district stated on the Picton board that he had shipped no less than two of the shipments of the Cherry Valley cheese factory to the American market and made more money than he would have by shipping to England.

Mr. Anderson: We have a herd on our farm of 35 cows, and we expect them to average 8,000 pounds this year, and we cannot see that there is a great deal of money in it even with that average, because it costs so much to keep them and for help and everything else, and the man that gets less milk cannot exist until he can get a better market for his product.

The resolution was put to the meeting and carried unanimously.

Mr. W. W. Moore: I would like this Association to petition the Dominion Government to take charge of the weighing of cheese in Montreal and also the appointment of a referee. We had one some years ago, but last year I do not think we had one. I think if the man who weighs cheese were appointed by the Government his certificate would have more weight with the farmers.

Mr. Samuel Wilson: How is it the farmer only gets 85 cents for his milk, and if he ships it across the line he can get $1.25? There must be a remedy for this, and something ought to be done. Another question I hope will be discussed at this meeting is the full settlement of cheese at the point of delivery. Some of the farmers, not very far from here, have received good lessons on that point.

Mr. Singleton: We are not really getting $1.25 per hundred for our milk shipped across the line. I think the contract price is $20 per ton for September and October. The system by which we have been shipping is that we receive $1.00 per ton and more than our surrounding factories paid for cheese. The farmer gets $1 a ton more than if the cream had been made into cheese.

Mr. Wilson: I think you will find that some farmers get $1.25.

Mr. Hyatt: The President of the board in one of the Eastern Provinces told me that they were paying $1.32, and I said, "Did you pay that in July?" and he said, "No, I only paid $1.10 in July." He said he had paid $4,000 in duty, and I asked him what effect it had on people where he was living, and he said it was a good deal like dumping a barrel of water into the St. Lawrence, the demand is so great, and with only 30 people in every 100 to produce the milk he said they were glad to get it over there.

A Member: We should consider the value of whey. I am of the opinion that the whey is not worth much money, and if you receive $1 per ton for your milk, I believe it will pay you, but if you decrease the value of the whey you will not be actually receiving the $1 per ton, because your pigs will not sell for as much money.

GUARANTEEING PAYMENTS BY THE WHOLESALE PURCHASERS OF CHEESE AND BUTTER.

The following resolution was presented, moved by W. A. Ross, of Kinburn, seconded by W. J. Johnston, Eamer's Corners: "That in view of the several failures of Montreal cheese-buying firms that have taken place in the past two years,

involving serious losses to farmers and cheese manufacturers; and that the Montreal firms engaging in the purchase of cheese and butter have persistently refused to make payment through bank draft attached to bills of lading of cheese consignments, the Ottawa Cheese Board consider it absolutely necessary that some guarantee of payment be required by firms engaging in the purchase of cheese and butter and that the Minister of Agriculture be urged to introduce legislation at the earliest possible moment requiring firms engaging in the purchase of cheese and butter to give bonds to secure payment for such goods purchased on Montreal inspection or otherwise, and thus afford similar protection to Canadian dairymen to that which is afforded through legislation to the grain growers of the Canadian North-West.

"And that this Board do send a delegate or delegates to the Eastern Ontario Dairymen's Association, which meets in Perth on January 4th, 5th and 6th, to urge upon that body the adoption of this resolution and co-operation in bringing about the same.

"And that all the other cheese boards of Eastern Ontario and Quebec be urged and requested to adopt this resolution and send representatives to wait upon the Minister of Agriculture upon such a day as shall be deemed advisable and convenient by all parties concerned."

Upon motion of Senator Derbyshire the resolution was referred to the Committee on Resolutions for consideration.

COW TESTING AS A MEANS OF INCREASING THE PROFIT PER COW.

Chas. F. Whitley, Ottawa.

In this advanced twentieth century, in this old cradle district of good dairymen, we should seriously enquire. are there any cows in this county to-day that do not earn any profit?

Chart No. 1 gives the age and production of each cow in an Ontario herd of 14 grades, and is typical of scores of herds in that particular district, as well as, probably, many other districts. One thing certain, it would be easy, from our records, to tabulate the results of plenty of herds far poorer than this. There is every indication of a dead loss with at least three poor cows, one of them a seven-year-old.

Chart No. 1.—Production of an Ontario Herd.

7 Best Cows.				7 Poorest Cows.			
Cow.	Lb. Milk.	Lb. Fat.	Age.	Cow.	Lb. Milk.	Lb. Fat.	Age.
1	5,460	185.4	5	8	4,150	144.4	6
2	5,060	178.9	8	9	4,280	139.7	6
3	5,000	170.3	7	10	3,790	132.6	7
4	4,870	169.6	10	11	3,640	125.2	6
5	4,620	165.6	7	12	3,480	124.0	3 *Loss*
6	4,670	160.8	6	13	3,390	112.6	7 *Loss*
7	4,463	160.3	9	14	2,890	98.8	3 *Loss*
Total.....	34,143	1,190.9		Total.....	25,620	877.3	

From these figures there rings out the challenge of the poor cow, a challenge to a modern farmer's intelligence and forethought. How long is she to be allowed to misappropriate good feed and act as a common poacher? Should she not be arrested as a vagrant and waster?

The figures also emphasize the heavy burden of the good cow. They not only have to "make good" themselves besides helping to pay off the mortgages, but they have the herculean task of dragging a few hundred thousand poor cows up a heavy grade before all, good bad and indifferent alike, can be represented as showing anything like a fair average yield.

The following details of this herd are worth careful consideration.

CHART No. 2.—ANALYSIS OF PRODUCTION OF AN ONTARIO HERD.

1. Average yield of herd, 14 grade cows, 4,269 lbs. milk, 3.4 test, 148 lbs. fat.
   Average yield of 7 best cows, 4,878 lbs. milk, 3.5 test, 170 lbs. fat.
   Average yield of 7 poorest cows, 3,660 lbs milk, 3.3 test, 125 lbs. fat.
   The best cows average 1,218 lbs. milk, and 45 lbs. fat *more than the poorest.*
2. The total earnings of the best cows are $85.23 *more than the poorest.*
   The total earnings of cow No. 1 are $20.70 *more than cow No.* 13.
3. With cost of feed at $35, the 7 best cows average $13.78 profit, making a total profit of $96.43.
   With cost of feed at $35, the 7 poorest cows average $1.60 profit, making a total profit of $11.20.
4. Cow No. 1 makes $19.60 net profit.
   Cow No. 11 makes $1.40 net profit.
5. Thus cow No. 1 makes as much profit as 14 cows like No. 11.

Fancy keeping 7 cows for a whole twelve months to make the magnificent profit of eleven dollars and twenty cents! This means 8 hours labor for 1 cent. How many of such cows would a man need to make a profit of $1,000? Further than this, in comparing the yields of 524 Ontario cows, I found that one-quarter of them gave an average yield of 282 pounds of fat, and one-quarter of them gave only 145 pounds of fat. With a value of 24 cents per pound placed on the fat, and $34 on the cost of feed, the profit in the one case is $33.68, but in the other only eighty cents. Stated in another way, it means that one of the good cows made as much profit as 42 of the poor ones.

So far as the ordinary factory patron is concerned, he wants only good cows, cows that are profitable. Unless a cow is on the dead line where income and expenditure just balance, she is kept either at a profit or a loss. If kept at a loss, in what does the loss consist? At least both in cash and time. Let us make a very simple calculation to ascertain the loss in cash. In the month of September there were 3,500 cows recorded in Ontario Testing Associations with an average yield of 722 pounds of milk. On dividing these cows into two groups, those giving above that average, and those giving below it, we find that the better cows produced more milk than the poorer cows to the value of $2,852. On the average the better cows produced 163 pounds of milk more than the poorer cows. Let us be liberal and cut off all the odd 63 pounds. Then, assuming that half the cows in Ontario could have produced only 100 pounds more milk per cow, we arrive at the astounding result that through keeping poor cows instead of fairly good cows, there was lost in just one month the huge sum of *half a million dollars.* Every month the poor cows are behind the good cows in that proportion of cash earnings. The poor cow must go. Cow testing helps to detect her.

Energy Going to Waste.

There is also a most serious loss of time and energy. The chart indicates loss with 3 out of 14 cows. Some patrons are keeping twice as many, and in other cases actually *three times* as many cows as their neighbors to obtain even less milk. It has frequently been stated that one half of the cows in the Province do not pay; but so as to make no wrong deduction let us take only 3 out of 14, this would mean 214,000 worthless cows in Ontario. Estimating that the time spent in going after the cows, milking and feeding them, and cleaning stables amounts to only 15 minutes per day per cow, this amounts to 90 hours lost during a year, which with 214,000 cows amounts to over *nineteen million hours* time lost in Ontario every year on poor cows. This is a terrific amount of energy going to waste. Time is money. We pay low grade, casual, unskilled labour 15 cents an hour, sometimes 20 cents. Is the farmer, the head of a going concern, the President of the company, to be rated as low, or lower? What return per hour does he expect for his labor, for his thought and skill as manager? From the humanitarian and philanthropic standpoint, especially, it is impossible to estimate the harm now being done to the country from this waste of time and human energy; or, on the contrary, the vast amount of good that would ensue, not only to the men themselves, but to their immediate dependents, the women and children, if this Niagara of wasted power were turned into profitable channels. Two and a half million horse power wasted as irretrievably as that of a squirrel in a cage—endless revolution, nothing accomplished! An important national problem, receiving attention to-day is the conservation of our natural resources. What we need—and I submit this is a problem of far greater importance—is an awakening to this appalling waste of dairymen's energy, this sacrifice of human life on Ontario farms to-day. Think of the dreary, profitless toil, the deadening of aspiration, and sapping of vitality of man and boy by this eternal slavery at the heels of the poor cows. Ontario must wake up and save the boys. Cow-testing is a means of rescue, and conservation of energy.

Poor Cows and Indifferent Farmers.

What is the quickest method of getting rid of these poor cows? There is a sprinkling of them in many herds, but probably the majority are kept by the very men who can least afford it, the men who are the poorest patrons. It seems to me that the makers at our factories are in an excellent position to help in eliminating poor cows. They, of all men, are most frequently in contact with the poor patron. They can prove from the factory figures, which include his own, that A is delivering more milk from his 9 cows than B from his 14. Every milk-receiving platform in the country should be made not necessarily a pulpit or judicial bench, but most decidedly the consulting room of the interested specialist. The maker's advice may mean thousands of dollars to the township. A timely hint, a little reasoning may change the view-point of life for the average or indifferent patron. It is to the maker's interest to extend the factory business and make it more profitable. He is paid out of profits. A better milk supply from the same territory will help him to get better wages. The maker's position is important, and deserves better wages.

The Factory Management and Raw Material.

When our cow testing records show that one patron receives more cash for the milk from his 4 cows than another patron from his 12 cows, it is the positive duty of every factory owner and shareholder, every dairy instructor, every influ-

ential public spirited man, any one who can grasp the significance of the present waste, to sound the slogan, "Better cows" in every remote dairy district. What boots it to have a few choice prize-winning cows just in a few spots in the Province? We need only good cows everywhere. Eliminating of the poor cows means progress, progress leads to perfection. There should be the strongest and deepest interest displayed by the factory owners and the makers in this matter of the production of individual cows because the supply of raw material is of prime importance. Financial benefit both to themselves and patrons *must* accrue through systematic endeavor to raise the productive capacity of the average cow supplying the plant. This line of effort should be an important and permanent feature of factory management. From the point of view of profits and stability of business it will yield handsome returns. Get after the poor patron, he is a reasonable being with good sense when you can reach it; the system is good, merit will eventually win its own reward. You have the right article, with the right pushing and bull dog tenacity, doubt will disappear like a snowball in a furnace.

More Cows and Better Cows Wanted.

The live issue of the day, the legacy of this generation of dairymen to the next, is cow testing. It will help to plug up the present leaks. It is no makeshift arrangement, no gloss of varnish or putty to hide deficiencies, but a practical every-day help. The scales do not make more milk any more than a thermometer raises the temperature, they simply indicate what action to take. Records are blazing signs on the "great white way" that leads to better cows. If we need to obtain more milk per acre, and our production at present is not consistent with the best dairy farming, we might well aim at at least 50 profitable cows per 100 acres, at least 8,000 pounds of 5 per cent milk in creamery sections—some men are doing this—and then improve on that. Aim high or never attain.

Many good cows of excellent promise exist in Canada. Their true value is just commencing to be revealed as a result of cow testing. At what figure they may next change hands depends entirely on the type of man in whose possession they are now. There is no reason why history should not repeat itself and a value of $10,000 be placed upon some cows in the Dominion. Bull calves from such cows are worth $5,000; don't sell them for veal for $8, as one unfortunate man did, because he never took time to ascertain what the dam could do. Three of the present champion cows of the world were sold within the last year or two for ordinary prices of ordinary cows, simply because their owners then had never had them tested—had never weighed and sampled. Possibly you have a $10,000 cow in your herd, and don't know it. Do you know your cows? Have you found out what each can do? Could you by any chance, unawares, sell a cow for $80 with $10,000 possibilities in her?

Increasing the Net Profit.

What is profit, and how can dairy products be increased? Profit is the excess of receipts over expenditure; true profit in dairying is the value of those cow products—milk, calf and manure—which are produced over and above what is necessary to satisfy legitimate charges against the cows. There is often considerable discussion as to what should constitute such charges. For example, dairying presupposes a certain sum, often a very large sum, of money invested in land, buildings, implements, and cows. That investment is worth interest, which is a charge against receipts; but for simplicity profit is generally reckoned as the ex-

cess of cash received for milk over the estimated cost of feed, produced or purchased. One point needs to be clearly understood, the total cash received for milk is very different indeed from the profit made. A business may be very extensive and the daily cash receipts very large, but unless profit is made, bankruptcy is certain. The expense side of the account must be considered. As regards dairying, particularly, the lower the expense the greater the profit. The price received for the product is fairly steady, no general or local shortage forces up milk prices materially, neither do bargain sales compel the producer to accept any absurd figure. To keep poor cows is to court ruin. A poor cow is a heavy expense, and can make no profit; a good cow, though she may cost more originally, costs only a trifle more for her feed, consequently the profit she earns is vastly superior. Net profit is increased in rapid ratio as the heavy dead wood of the herd is lopped off. Cows that consume a greater value of feed than the value of the milk they produce are a double drag and burden. They incur loss individually and lower the average net profit of the whole herd. Frequently such losing propositions are believed to be fairly good. The only way to detect them is to weigh and test each individual. Conversion of such calamities into blessings, of loss into profit, is comparatively simple when once cow testing is commenced. Large profit with good cows is a higher return than savings bank interest where the bank is just borrowing farmers' good money at 3 per cent. and loaning it out at 7 per cent. Some dairymen make 20 per cent on their investment. If we concede that there is of recent years an increase in the price of grain, of hired help, of living expenses, if we cannot escape an occasional drought and shortage of feed, then how emphatic the necessity of keeping only such cows as do return a large profit. Cow testing provides a simple, effective, and cheap method of determining which to keep, which to beef. A farmer's future income depends on selecting his best cows. The vital point is to ascertain the difference in yield, and whether Bess or Spot returns $5 or $30 net profit, whether for every dollar's worth of feed consumed she gives a return of 90 cents or $2.50, whether the milk costs 60 cents per 100 pounds, or $1.40. That is the essence of real dairy business. The study of each cow will lower expenses through the use of scales and test in eliminating the poor cow, and thus increasing the net profit. What we need is to get at it, and to keep at it. The streets of By-and-Bye lead to Nowhere. Procrastination in cow testing retards general progress and development. Farmers who have achieved success in increasing the yield of milk and fat per cow, all, invariably, date the commencement of the improvement to the time they began weighing and sampling. This is no chance occurrence; cow testing is necessary, it is foundation work. The following chart shows how well they are building:

CHART NO. 3.—PRODUCTION OF TWO ONTARIO HERDS.

1. Average, 15 grades; 6,210 lbs. milk; 3.6 test; 228 lbs. fat.
   Lowest yield, age 4; 5,210 lbs. milk; 3.6 test; 191 lbs. fat.
   Profit varies from $16 to $37 per cow. (Feed, $40.)
2. Average, 9 grades; 6,567 lbs. milk; 3.6 test; 241 lbs. fat.
   Lowest yield, age 2, 4,690 lbs. milk; 4.0 test; 187 lbs. fat.
   Herd includes two 2-year-olds, three 3-year-olds.
   Average profit $25 per cow. (Feed, $40.)

Each cow makes a fair profit.

Note the remarkable extra increase in profit as the milk yield increases. A yield of 4,500 lbs. milk may give $5 profit above cost of feed, but a yield of 9,000

lbs. milk may give $40 profit; that is, twice as much milk, but eight times as much profit.

Chart No. 3 is intended to emphasize one or two points. First and foremost is the fact that each cow in both herds earns a profit above the cost of feed. There are no exceptionally heavy yields, *but* there are no poor cows being carried at a loss. That is what makes these two herds so satisfactory. Both of the two lowest yields of fat (one from a 2-year-old) are actually higher than the best yield in the first chart. It is the man, not the cow, that is responsible. His brains should discriminate.

These represent two fairly good average herds, due to selection on records; herds of fairly uniform production, herds in good working order on a profit-bearing basis, and herds that will probably be considerably improved. Such herds are needed on every dairy farm, and are easily within the grasp of any man who will adopt cow testing.

Substantial Increases in Milk Yields.

The brighter side of the picture is the steady growth of cow testing associations, in the number of individual farmers taking up the system privately, and in the substantial increases in milk yields they have obtained. Several instances of such definite gains were published in our last annual report. We still have much to accomplish; we should be able to show a similar or even a better increase than the dairymen in Sweden, who in six years have made a gain with 36,000 cows of 31 per cent. in the yields of milk. This will come when our farmers are known by the sign of the "Triple S," silo, scales, and samples.

Chart No. 4 shows what cow testing is designed for, and what it accomplishes in the hands of dairymen wise enough to profit by the teachings of the scales and test.

It is evident that a very modest estimate is made when it is claimed that as cow testing becomes generally practised the production of all cows in the Dominion can easily be increased by 1,000 pounds of milk; this means additional income for farmers to the extent of *twenty millions of dollars.*

Chart No. 4.—Some Definite Gains from Cow Testing.

Name and Address.	1906.	1907.	1908.	1909.		Increase.		No. of Cows.
	Lb. Milk.	Lb. Milk.	Lb. Milk.	Lb. Milk.	Lb. Fat.	Lb. Milk.	Per Cent.	
S. A. Freeman, Culloden	5,149	5,871	6,211	6,708	.....	1,559	30	70
W. J. Curtis, Willetsholme	4,334	Average		6,267	198	1,933	44	16
W. E. Thomson, Woodstock	5,500	Yields		10,500	330	5,000	90	11
A. J. Davis, Woodstock	4,500	Per Cow.		9,144	338	4,644	103	20
T. E. Jory, Lakefield	.....	4,961	.....	6,511	238	1,550	31	8
J. K. Moore, Peterboro'	.....	6,709	8,050	8,978	298	2,269	33	20
W. Paul, Peterboro'	.....	4,359	5,218	5,845	206	1,486	34	13

Such remarkably substantial increases should be an inspiration to every dairyman.

This chart also shows that farmers in Western Ontario are getting more good out of cow testing than those in Eastern Ontario. This is strange, especially in view of the fact that the East depends more than the West upon dairying as a means of livelihood; it might further be pointed out that the East seems to need the

improvement more. The average yield per cow in the East is below that of the West, and can be considerably increased.

The Dairy Division has endeavored to give just as much encouragement to cow testing in the East; a representative of the Department is always available to help any locality that shows any interest in taking up the matter. The Department still offers to pay any maker at the local factory for testing the samples, so that farmers are at the minimum of expense, having just to provide scales, dipper, and sample bottles.

More than three times as many cows were under test in 1909 as in 1906, the figures running close to a total of 54,000 during the year. These are cows in connection with associations. In addition to this several thousand blank record forms have been distributed to individual farmers, not belonging to associations, who are also keeping records as a result of frequent announcements made by the Department.

A MEMBER: I would like to know what particular breed of cattle these are, Holsteins or Jerseys?

MR. WHITELY: Some Holsteins and some Ayrshires. No particular breeds, as far as I know. I think I am safe in saying there would not be on that list more than one per cent. of pure breds.

Q.—Do they do this testing on cold mornings like this?

MR. WHITELY: Yes. I got in records of 200 cows this morning. Since we started in 1906 our records are over three times as many as they were in that year. We were then getting records of 2,800 cows, and this year we have over 10,500.

MR. BARR: You have about one hundred and sixty cow testing associations in Ontario. How many of these associations are east of Peterboro?

MR. WHITELY: We have a small one at Prescott and one at Norwood and one at Alexander. Only three east of Peterboro, and in Oxford County there are sixteen, if not twenty. There is one at Perth.

MR. BARR: Will you try and find out from this Convention why the people east of Peterboro are not in this work. We at the Dairy Division are anxious to extend this work, and we are only too glad to do all we can to extend it; but we cannot do so unless the farmers give us their assistance. We have never yet had a herd in Eastern Ontario that will take a place on the chart and show up well. Eastern Ontario heads the list in Canada for the production of milk, and yet we find that they are indifferent about this business. I would like to know why the men in Eastern Ontario do not take up this work, and I hope this year we will have twenty-five associations in Eastern Ontario. I expect to go to the Northwest in two or three weeks, and I want to take out something from Eastern Ontario; but if I take out any records we have so far it will be a poor herd.

A MEMBER: You have to improve the feed as well.

A MEMBER: I have been weighing my milk for about four years, and I would not give it up on any account, although I have not achieved any great success. Every man has got to take advantage of his own conditions. Mr. Whitely said averages were deceiving, and I know they are. It would not be fair to take the cow that gives the most milk and average her with the poorest cow. The three-year-old heifer that is put in the last column may not be such a poor cow after all. One year I took my scales to the front of the cow. Every cow does not alike. I found that there was three times the difference between what one consumed and another, and that a three-year-old heifer may turn out to be one of the best cows you have, while the seven-year-old cow might be let go. And you will find that the progeny of one cow will be a persistent milker right straight through. I have one

cow that I do not think I would sell because she has that faculty of impressing on every one of her heifers that milk producing quality, and every heifer from that cow is a good milker. That faculty is inherited, not from a thoroughbred, but from an old scrub, and I imagine there have been a good many fine cows dubbed scrubs and thrown out and thoroughbreds put in their place when the so-called scrub was the best article of the two. How would you like to have a 10,000-pound milker and put a "Home" boy out to milk her? You should pay particular attention to a good cow and milk her thoroughly, or you won't get the profit. I believe every man should have a scale, and you won't have to weigh very long before you will get results. (Applause.)

A MEMBER: I think the great problem with the farmer in connection with the dairy cow is lack of interest. I have been selling cheese in Campbellford district, and some of the factories are very poor. Last year we organized a joint stock company, and got the patrons thoroughly interested, and during the last year we sent in 1,706,633 pounds of milk. At our annual meeting I got the number of cows. I found that we had about 344, which made an average of 4,946 pounds of milk, and it was through the interest the farmers took that we got them up to that standpoint. During the present year some patrons with practically the same number of cows have increased 93 standards.

A MEMBER: What do you mean by standard?

A.—Three thousand pounds of milk is a standard. That is what a farmer wants. He must look after things and take an interest in his business.

LETTER FROM MR. J. A. RUDDICK.

HY. GLENDINNING, ESQ.,

President Dairymen's Association of Eastern Ontario:

DEAR MR. GLENDINNING,—It is with much regret that I find myself unable to attend your Convention. I have been confined to my house for nearly two weeks with a bad attack of bronchitis.

I have asked my assistant, Mr. W. W. Moore, who is Chief of the Markets Division in my branch of the Department, to take my place on the programme, and tell the convention something about that part of our work which he supervises. We feel that no work which we have been doing for the past ten years has been of more benefit to the dairy industry, and yet the average dairyman knows very little about it.

I hope that the cow testing work will receive its share of attention from the Convention. There is surely no more important matter for the consideration of the farmers of Eastern Ontario, and yet I regret to say that less progress has been made in the section represented by your Association than in any other part of Eastern Canada. It seems strange that this should be so, because no other district in Canada depends so largely on dairying.

In this connection I am pleased to announce that the Minister has approved of a plan for further promotion of this work, which will enable us to place a man in charge of a district covered by a group of four or five cheese factories. The man will keep a horse and spend his whole time among the patrons of these factories, so as to get into touch with every one of them. We shall continue our present propaganda, and hope to extend the work all along the line.

Trusting that you will have a very successful Convention, and wishing the dairymen of Eastern Ontario a very happy New Year, I am

Yours faithfully,

J. A. RUDDICK,

Dairy and Cold Storage Commissioner.

COLD STORAGE FOR DAIRY PRODUCTS.

W. W. MOORE, OTTAWA.

I desire to give you a short talk on the work the Minister of Agriculture is doing through the Cold Storage Commission Branch in improving the transportation facilities for the proper handling of dairy products.

I need hardly point out to an audience of intelligent men such as I see before me that the safe and careful handling of butter and cheese, fruit, etc., is of the utmost importance to the farmer, the dairyman, and the fruit grower. No matter how skilful and careful your butter or cheesemaker may be, and no matter how fine a product you have, if it is in any way injured through transit through the market, the producer has to take less money for it, and the loss in every case falls upon the farmer and not on the shipper or manufacturer.

Our transportation facilities for butter and cheese are reasonably good. Such was not always the case. Fifteen years ago special attention was brought to the matter of the carriage of our fine foodstuffs, butter and cheese, and in 1895 the Department of Agriculture took the first steps to improve the transportation on our railways and steamships, and improvements have been going on steadily until to-day we have splendid facilities.

In 1901 our export cheese trade was in a very precarious condition, and we received constant complaints from importers in Great Britain to the effect that the Canadian cheese was arriving in a heated condition. That was due to the fact that the cheese was carried from Montreal in ship holds which were badly ventilated, and owing to the rough handling the packages were badly broken.

Dr. James W. Robertson, then Commissioner of Agriculture and Dairying, gave evidence before the Parliamentary Committee on Agriculture, in March, 1901, in which he said: "Last season our cheese trade got the worst setback from poor boxes and heated quality it ever got. I do not know of a time when it was in a more doubtful position than it is at present. We got good prices in the summer, but hot weather in August and September caused the cheese to be heated, and much of it was landed in England in poor condition. It looks as if we might receive this summer of 1901 to the extent of $2,000,000 less for our export cheese trade, because of the bad impression made in England last season by the poor condition in which much of it landed." Further on the Commissioner said: "I have here a memorandum, furnished by an importing firm in Great Britain, reporting on quantities of cheese delivered in a heated condition after August 2nd, 1900. From August 2nd until September 26th this firm reports 45,358 boxes arriving in heated condition, *ex* 19 steamships. They add: 'In most of the above-mentioned shipments the boxes have also been very roughly handled in transit, and have arrived here in badly broken condition.'"

In 1902 steps were taken by the Department to provide cool air compartments on steamers, and a system of cargo inspection was inaugurated. We have six cargo inspectors at Montreal and five in Great Britain. We also have one man looking after Quebec and another at Halifax. These inspectors are on duty all the time when perishable products are being loaded into the steamers. They see that the stevedores handling cheese and butter and other products are doing it carefully, and that it is properly stowed in the ships. They keep going through the warehouses on the docks and down to the ships' holds from time to time, and look after the stowage, and seeing that the cheese boxes are carefully dunnaged, so that there will be good ventilation during the voyage.

We have been able to effect considerable improvement in the handling of our products in Montreal. When we began our work the cheese was loaded in nets and the boxes in the centre, and those at the bottom were frequently injured, and after a great deal of trouble we induced the steamship company to discontinue the use of these rope nets, and now they are using the platform sling.

Our inspectors also see that the refrigerator chambers are in proper condition, and have placed thermographs in the holds of ships. These are self-recording thermographs, and show at the end of the voyage the temperature in the holds during the entire voyage. Our inspectors have no legal status on the docks. There is no legislation behind them, but we have had no friction with the steamship companies. They recognize it is for the best interest of all concerned. One great cause of breakage in the cheese boxes was rough handling by the teamsters, but we have had that remedied, and most of the cheese are now shipped directly from the car into the steamer. In 1910 our inspectors placed 645 thermographs; 229 were placed in cold storage, 65 in cool air chambers, and 351 in ordinary storage.

At the end of the year we compiled a statement from the reports of our inspectors, showing the total of perishable goods shipped from Montreal, and that is the only statement of its kind. This year the total quantity of cheese shipped from Montreal was 1,890,357 boxes; 480,413 carried in cold air compartments, 1,409,944 in ordinary storage.

We have been very fortunate in having a good staff of men in the Old Country. A great many changes have taken place in Great Britain since we first started this inspection work. In London our butter used to be delivered on lighters away down the river, and our cheese at the Tilbury docks, where they were loaded on cars and carried to the Commercial Road Station, and delivered from there to the consignees by vans. That meant that the cheese was handled five times in 35 hours, and they suffered a great deal of damage from exposure. About five years ago all this was changed, and to-day our cheese and butter are distributed from the ships at the Surrey Commercial Docks, which is within two miles of Tooley street, the centre of the Dairy Produce Trade in London, and we have very little complaint of heated cheese during the last two years.

I received a letter in August last from a firm in Bristol stating that 264 boxes came to hand in very bad condition, evidently suffered severely from heat, and stating that they would be much obliged if we would give them a report of the condition of these goods when they landed from the vessel. I wrote them that I had looked up the report of our cargo exporter at Bristol, and had found that the ship had been a week in dock before being discharged, and a quantity of the cheese —and particularly those 'tween decks—got warm and sweaty. The letter ran: "Many of the cheese of the Excelsior brand were packed in boxes far too large for them, particularly those branded Collins Bay Co-operative Cheese and Butter Factory: some of these had one and a half to two inches space between the cheese and

the box. Breakage, 30 per cent." When they get this information they know where the fault lies. To give some idea how closely the inspectors watch the steamship companies, I have an extract from the report of our Glasgow inspector, dated August 5th, in which he refers to the cargo landed from the steamer *Saturnia,* of the Donaldson Line: "This steamer carried 90 boxes of cheese from Avonbank factory, shipped by John Brown, and the boxes were found in very bad order when landed in Glasgow, 44 being broken; 16 of these had been roped at Montreal prior to shipment." The inspector adds that the wood in these boxes appeared to be very brittle.

I wrote to the agents at Montreal, and they replied: "The cheese were in fair condition, but all marks showed considerable grease on ends, and in all the parcels several of the boxes showed grease through the boxes. The cheese were stowed in the No. 1 'tween decks after part, along bulkhead and immediately in front, and throughout the remainder of this compartment hay was stowed. There is a fan to this 'tween deck, and in the plan of ventilation two ventilators are shown in the forward end and two in the after end, and the fan aft. On going over the steamer to find if the ventilators and fans were in accordance with the plan supplied to me, I found that there were no ventilators in the forward end of this 'tween deck, but the two aft and the fan were correctly stated. The lack of the forward ventilators naturally did not permit of the proper or necessary forward draught, and rendered this compartment insufficiently ventilated for the proper carrying of perishable products, such as cheese and apples. I pointed out the lack of forward ventilators to the Marine Superintendent, and he states this will be rectified by the erection of two ventilators in the forward end: he affirms it to be an omission on the builder's part, as all the 'tween decks and lower holds, according to specification, have forward and after ventilators, and, in addition, Nos. 1, 2, 4, and 5 'tween and lower holds an electric fan; the No. 3 'tween decks and hold having ordinary ventilators only."

When I got this report I wrote to the agents at Montreal. They replied that as soon as the ship reached that side they would look into the matter, and if the alterations had not been made they would have them attended to.

The inspector in England is on hand when the cargo is being discharged, and he sees that it is properly handled. The first thing we get from the Old Country is the thermograph records. As soon as the steamship breaks cargo our inspector takes them out and gets the records, and as soon as we get them we use them as negatives and make six duplicate prints. Two we keep at Ottawa, one is sent to the Secretary of the Montreal Produce Exchange, one to the steamship agent, one to the ship's engineer, and one to our Montreal office. We have made over 42,000 copies this year.

We have had some complaints of heated cheese at Montreal, and one cause of complaint was some cheese that came in by the river boats. We found that they very often loaded the butter and cheese right close to the boiler, and we appointed one man to do nothing else but watch the river boats at Montreal. We also took the matter up with the owners of the boats, and did all we could to better conditions. We sometimes receive complaints about the broken condition of the boxes on arriving at the other side. Here is a letter I wrote to the Secretary of the Collins Bay Cheese Factory in June last: "Many of the cheese of the Excelsior brand were packed in boxes far too large for them, particularly those branded Collins Bay Co-operative Cheese and Butter Factory. Some of these had one and a half to two inches space between the cheese and box. Breakage, 30 per cent."

I wrote the Avonbank Cheese Factory on August 5th: "This steamer carried 90 boxes of cheese from Avonbank Factory, shipped by John Brown, and the boxes were found in very bad order when landed in Glasgow, 44 being broken; 16 of these had been roped at Montreal prior to shipment. The inspector adds that the wood in these boxes appeared to be very brittle."

I wrote the factory at Mount Julian on August 5th: "According to our inspector, the breakage is due largely to the fact that the boxes did not properly fit the cheese. The shipment was a small one, consisting of only 45 boxes, but of these 15 were landed broken."

For a number of years past we have arranged with the railway company to supply iced cars to the shippers. That arrangement was enforced this year from June the 20th to September 3rd, and we paid charges on over twelve hundred cars this year.

This arrangement was started some years ago for the purpose of demonstrating to the shippers and the dairymen the advantage of using ice refrigerator cars during the heated weather. It was hoped that after a few years, when the benefits from the ice cars was generally known, that the Department would be able to withdraw and the shippers pay the charges themselves. We appear to have demonstrated the value of ice cars already, because there is a tremendous clamor if the arrangement is not in force when the hot weather arrives, but for some reason the shippers do not seem inclined to pay icing charges. It never seems to occur to them that they could get cars from the railway company by simply paying the charges. The charge is $5 a car load of cheese, and works about 15 cents per one hundred dollars, and that seems to be a pretty good insurance to protect your goods from depreciation through heat.

I am strongly of the opinion that the Department ought to withdraw this arrangement now as regards car loads, and it should apply only to the pick-up service, so that the small factories that are not able to get together enough cheese to make up a car will get the benefit.

SENATOR DERBYSHIRE: We want the cars iced as they have been, and an additional number and better service. (Applause.)

MR. MOORE: I am very glad to get an expression of opinion.

MR. SINGLETON: We want the pick-up service put on as well.

MR. MOORE: I do not see how we can do the whole thing. If we are to put on a pick-up service, and if we are to extend it, it simply means that the Government will have to pay icing charges on all the cheese that is handled in this country during the hot weather. If the people of this country say they should have it, I dare say they will get it.

SENATOR DERBYSHIRE: We have got to have it, and it is our business to get it. I would like to impress upon our friends that we want these ice cars continued and enlarged and the pick-up service in addition. Do not make any mistake about that.

MR. WILSON: I wish to point out the inconvenience it would be to the shippers if they had to pay the charges. Very few shippers have a car load. Sometimes two or three men ship in the same car. I think it would be a very small thing if the Government were to withdraw that service. I have taken advantage of that service ever since it started.

MR. BLAKELY: We ship by boat. Our cheese go down free, and I am satisfied they reach Montreal in a heated condition. We have tried to have the matter rectified, and we cannot do it.

SENATOR DERBYSHIRE: You could have it done if you say to the men who own the "Alexander" that they cannot have the cheese unless they furnish proper means to ship.

MR. BLAKELY: The cheese are sold there out of our hands, and it is cheaper to ship by boat than by rail.

MR. MOORE: As a rule, river transportation is cooler than by rail, and if the cheese are put up away from the boiler there should be no danger of their being heated. We put a man on the "Water Lily" the summer before last with a thermograph, and we had to effect some improvements. They had only a common, ordinary board bulkhead between her deck's head. She is practically an old barge, and they had a steam pipe running full length under the deck up to the tank. We got them to insulate that compartment by putting in shavings, and we made them take the steam pipe out of the hold, but we could not see any way of icing, as there was not sufficient room.

A MEMBER: I do not see how this service benefits the farmers. The cheese are the same prices that they were years ago, and the price of every other farm product is double.

MR. WILSON: There is more expense in manufacturing, and it all goes into the middlemen's hands to keep the black coat on them.

SENATOR DERBYSHIRE: I would like to say to these people that there has not been one per cent. made in the last three years by any firm of exporters handling cheese on the continent, as far as I have records, and I am satisfied I have the records right. There is less money made in this business than in any other. There are men who bought cheese on our Board this year that I would not sell anything to, and yet they would give one-eighth of a cent more than a respectable buyer who pays for what he buys.

COMMON SENSE IN THE CATTLE STABLE.

G. E. DAY, O.A.C., GUELPH.

In choosing a title for this paper, I had no desire to be eccentric, nor to assume that I had a "corner" in common sense, but the choice was the result of difficulty in finding a title broad enough to cover the somewhat disconnected odds and ends which are to receive attention.

BREEDS. The farmer is noted for being conservative, but in regard to breeds of live stock, that which is new is apt to prove more attractive than the old. We find men who have failed with Ayrshires turning to Holsteins or Jerseys or some other breed to help them out, and men who have failed with Holsteins or Jerseys or some other breed, flying to Ayrshires for relief, and the cry is heard throughout the land, "Which is the best breed of dairy cattle?" Let us stop and ask ourselves why all these breeds continue to exist and to prosper in this country? If any one breed outshone all others in every respect, would it not have replaced all other breeds by this time? All breeds have their misfits. There are good, bad, and indifferent animals in all breeds, and, so far as any person knows, it requires just as much brains, just as much skill, just as much intelligent and persistent effort to make a success of one breed as of any other. The man who fails with one breed is not likely to succeed with any other, and the man who studies and knows the breed he is handling will meet with his reward.

FEEDING. A full discussion of feeding cows will not be attempted, but there are several general facts of which no farmer should lose sight.

1. The cow is no latter-day worker of miracles. Her product must come either directly or indirectly from the food she consumes, hence, to be a large producer she must be a large consumer. It does not follow, however, that all large consumers are large producers, and it rests with the farmer to discover the profitable and unprofitable members of his herd.

2. The milk of the individual cow is a product fairly constant in composition. There will be variations, but they are of short duration, and the character of the food has no marked or continued influence upon the composition of the milk. The bulky, home-grown foods are rich in carbohydrates, but are apt to be deficient in protein, from which is derived the casein, or curd, of the milk. If, therefore, a cow is given food which does not supply enough protein for the largest flow of milk she is capable of producing, she will go on giving milk containing the same per cent. of casein as she would if her food were rich in protein, and the only way she can do this is to cut down the number of pounds of milk. The farmer who appreciates the fact just stated is in a much better position to buy foods to advantage than the man who trusts to luck in making his purchases.

3. There never was a time when the farmer needed to be so wideawake in the purchase of foods as he should be to-day. So many new foodstuffs are being placed upon the market that it becomes absolutely necessary for the purchaser to know something of the use of the different constituents of foods, and to know the composition of the food he is buying, if he would invest his money to advantage. The following quotation is taken from an advertising circular issued by the vendors of a new foodstuff, the name of which I have omitted:

> "As we have shown, the composition of ————, rich in carbohydrates, is peculiarly contributive not only to the more plentiful yield of milk, but also to a higher percentage of butter fat."

When philanthropic gentlemen, imbued with a laudable desire to benefit the farmer make a statement such as the one quoted above, is it not time for farmers to sit up and take notice? And is it not time that they realized the importance of knowing something of the functions of the principal constituents of foods, if they would protect their pocketbooks? With all the means of obtaining information that we find in existence to-day, there is no excuse for the farmer who remains ignorant upon matters which so vitally affect his business.

Stables. We often allow fads to obscure our vision regarding facts. There are men who are cruelly neglectful of the health and welfare of their animals, and there are others who are cruelly solicitous regarding the same. We have time for only a few suggestions under this head.

1. There are some who believe that the continuous manger is the only kind fit for use, but overlook the fact that it is recommended on account of cleanliness, and fail to keep its surface clean. The way many of these continuous mangers are constructed leaves them open to grave objections. Greek mythology tells us of Tantalus, son of Jupiter, who, as a punishment, was made to stand in water up to his chin, with choice fruits suspended just above his head. When he attempted to drink the water receded, and when he attempted to grasp the fruit, it moved away just out of his reach. A poor cow with her neck through a stanchion, struggling and straining to get the food which is just beyond her reach is a modern representative of the ancient Tantalus. The danger of injury, especially to a pregnant cow, is too obvious to require explanation. Further, the manger which allows food to escape upon the floor of the passage, from which it is swept back into the manger along with any filth which may have dropped from the attendant's boots, is not constructed upon sanitary lines. The old-fashioned manger, constructed to

avoid sharp corners, is much to be preferred to one which permits either of the evils just described.

2. Watering presents serious problems. Outdoor watering, where the cows drink, or try to drink ice water, and where the strong oppress the weak, is barbarous. Whatever system of inside watering is adopted, it should be arranged so that the pipes and water troughs can be flushed and cleaned. There is little to say in favor of providing each cow with a separate drinking basin, which is so constructed that it cannot be cleaned. A continuous water trough, open and easily cleaned, would be preferable in spite of its objectionable features.

3. Everybody understands something of the benign influence of light upon all forms of animal life, yet how many there are who seem afraid to put a few extra panes of glass in the stable walls. The dreary dungeons in which some cattle are kept would seem to be purposely planned to shorten the cow's span of life, and a really well lighted stable is an exception instead of the rule.

4. Outdoor exercise in winter is a matter at which many dairymen balk, but filling the lungs a few times with pure outdoor air is a wonderful tonic, and a bulwark against disease. Outdoor exercise does not mean turning cows out in the morning and leaving them to shiver about the yard until evening, but with a well sheltered yard there are few days when cows would not be benefited by a brief turn outdoors. It might be only a few minutes, or it might be an hour or two, depending upon weather conditions, but it would give a chance to thoroughly air the stable. It might mean a few pounds less milk, as many claim, but it would give us more vigorous breeding animals.

5. Ventilation has been talked so much that it has become a hackneyed subject, but it seems the talking has not been particularly effective. Dairymen seem convinced that high stable temperatures are necessary to the highest milk records. Perhaps they are, but it is possible to pay too much for a good thing. Is it worth while to poison a good cow for the sake of a few pounds, or even a few hundred pounds of milk? Would it not be wiser to spread her usefulness over a few more years, even though she may not break any records? Personally, I do not think anything is gained by this poisoning process, and I believe a cow will do better work in the long run in a well ventilated stable, even though the temperature may be as low as freezing point at times, than she will in one of these stinking, dripping poison boxes which some people call warm stables.

To be effective, ventilation must work unceasingly, night and day. It won't do to be constantly opening and closing the vents and inlets. Vents are necessary, but inlets are equally so. What would you think of a man who kept the damper of his stove tightly closed, and tried to improve the draft by increasing the number of stovepipes? This is the plan some of us are following in our attempts at ventilation. Experience leads me to prefer a system where the vents run from the ceiling straight up through the roof, and the fresh air inlets are at or near the floor, properly guarded outside and inside to prevent direct drafts. This system lowers the temperature more than one where the vent opens near the floor and the inlet is near the ceiling, but it will give much purer and drier air, and it is easier to prevent draughts when the inlets are at the floor. The system recommended is simple and inexpensive, and animals of all ages will thrive in the dry, cool air of such a stable in a manner pleasing to see.

Disease. Only one disease will be dealt with here, and that is tuberculosis. There are those who would make us believe that the whole bovine race is rapidly going to destruction through this disease, and there are others who make light of

the whole matter, and regard tuberculosis as a very unimportant thing. As a rule, truth lies about midway between extremes, and while there is no need for panic and reckless slaughter, there is urgent need of being on one's guard.

In dealing with tuberculosis, one thing must never be lost sight of: *the disease is contagious, and must be treated as such if we would fight it successfully.* Whether it is communicable from animals to human beings is a matter of dispute, but there is no gainsaying the fact that one animal will take it quite readily from another.

To illustrate what can be done in the way of fighting tuberculosis, I shall give the results obtained in an important herd which is under my supervision and that of my associate, Prof. Wade, to whom is due the credit of the satisfactory results obtained up to the present.

The herd was first tested with the tuberculin test in the spring of 1909. After the test, the stables were disinfected with crude carbolic, and afterwards sprayed with hot lime whitewash to which had been added some crude carbolic.

All of the more valuable cows which reacted, that is, gave the characteristic rise in temperature after injection, which denotes the presence of tuberculosis, were placed in a stable by themselves, and there were enough of them to justify putting separate men in charge.

A few of the less valuable animals which reacted were slaughtered, and the carcasses subjected to expert inspection. Some carcasses were condemned, and some were passed as fit for human food.

The animals which showed no reaction were placed in stables by themselves, and kept entirely separate from the other herd.

Calves born in the diseased herd are removed immediately and fed upon milk from healthy cows.

The milk from the diseased herd is sterilized before using.

Unless for some special purpose, calves are not tested with tuberculin until after they are six months old.

The following table shows results to date:

Date of Test.	Number of animals tested.	Number of healthy animals.	Number of diseased animals.	Per cent. of diseased animals.
Spring of 1909..	74	34	40	54
Fall of 1909....	47	42	5	10.6
Spring of 1910..	49	46	3	6.1
Fall of 1910....	65	65	..	....

In explanation of the table it should be stated that in the first test the whole herd was tested except calves under six months. The figures given for subsequent tests represent only animals which had previously passed the test, together with such calves as had become old enough during the interval to have the test applied.

It is worthy of special note that in the last test there were twelve heifers which are out of diseased mothers, and that all of these heifers passed the test.

It would be too much to expect that no further reactions will occur in this herd, but the results, to say the least, are extremely encouraging, and go to show what can be done when tuberculosis is regarded as a contagious disease and is treated as such. With proper supervision and wisely administered Government aid, it would be possible to completely eliminate tuberculosis from our herd.

In conclusion, let me say that, whether or not I have talked common sense, I must leave my hearers to judge, and they will now be given an opportunity to call attention to those matters in which I have erred.

Mr. Smith: Do you use that sterilized milk?

A.—No, we use milk of a healthy cow. When the milk is sterilized it is not so digestive for the calves.

Q.—What do you do with the milk?

A.—It goes into the dairy. It is all right to sell, but as a matter of precaution it is sterilized.

Q.—Do you not retest any of the cows that react to find whether they recover?

A.—If a cow once reacts you cannot depend much on the test after that. One cow in particular reacted in the first test, but we never got it to react again. We have not slaughtered her as yet, but she was an old cow and we did not take any chance on her. She is in the infected herd and is a valuable cow and we will never know the rights of that thing, because she may acquire it in the meantime. We won't know whether she had it at the time or not. Occasionally we had reactions where we were not able to find any trace of the appearance, but these cases are very rare.

Q.—Why should not the cow recover the same as a human being?

A.—She may, but she is a risky proposition.

Q.—Might you not make a mistake as to the temperature?

A.—We take the temperature every two hours during the day.

Q.—Is that sufficient?

A.—It is as a rule. It would be better, I suppose, if a man could take it two or three days. If there is anything abnormal in the cow's temperature the first day do not inject her until you get a normal run. We had an experience with a Jersey bull. The first time he passed the test successfully, but before the time came round to test again he took sick with indigestion. Indigestion often accompanies tuberculosis if it affects the bowels. He got in a very bad shape indeed, and when we tested the second time he was sick. But his temperature was normal and we thought we would try him. His temperature remained normal the next day and the bull seemed to get a little better; but then he got worse and I was scared of him. I thought he would poison the rest of the bulls. He was a valuable animal, and our veterinary thought he was going to die. I said, "Let him die soon." He did die soon after that. We had a post-mortem examination. Our veterinary and Professor Wade went through him as carefully as they could, and they could not find a trace of tuberculosis. But, if you ever saw an animal that looked like a tuberculous animal, you would think he was one.

A great many people tell you these tests poison animals. Do not believe them. I have never yet seen an animal apparently suffer any injury from the test; but I have seen animals that did not go quite high enough. If an animal goes to 104, we call it reaction. If it goes to 103 we call it suspicious. I have seen animals that did not give reaction in the second test; but almost invariably that animal would stand there and tremble. If an animal does that after injection I would condemn him just the same as if he showed a rising temperature. It makes some trouble, because when you go to buy an animal some dishonest fellow may inject some of this stuff into the animal before it is tested, and that makes all the difference.

Q.—What are some of the symptoms that you detect with the naked eye?

A.—As a rule animals that react do not show any symptoms. My associate thought there was something that would indicate the appearance of the disease. He took the trouble of going over every animal and making notes on the appearance, the character of the hair and the appearance of the eye; and when he got through the test he said, "Oh, pshaw, you cannot tell anything about it." Some of the animals that he thought were all right fell down, and some of those who did not look just the strongest went through. The disease will sometimes be accompanied by a cough when it is in the lungs, and yet I have seen animals with their lungs absolutely putrid with the disease and they had no cough whatever. Indigestion is more apt to cause a cough than tuberculosis.

Q.—How did you come to test this herd if you did not have any signs of tuberculosis?

A.—We lost one or two animals and we knew we had it. Some animals will show symptoms; the eye is dull and the coat is dry. I believe a good bright eye is one of the best indications. If the eye does not look full and bright it is worth looking into. Take a herd in which tuberculosis is prevalent and you will find some trouble with the udders of that herd.

Q.—In what way?

A.—Maybe a cow will lose a quarter, or it will harden; or maybe one quarter gets enlarged or seems to have a hard core in it or gives bloody milk.

Q.—What about the milk?

A.—I presume the milk would contain the germs. But it is an extremely difficult matter to find tubercular germs in the milk. Sometimes the milk will not contain it, and other times there will be a lot in the milk. Of course, a cow with a diseased udder from tuberculosis is a dangerous cow. I do not know whether she is dangerous to human life or not. I would not like to say. But I would not care to have my children use it, nor would I give it to calves or pigs. It will fix them very quickly.

Q.—Would you recommend the average farmer to make tests as you have made?

A.—I do not think the average farmer could do it without Government aid. If a man could afford it, I believe it would pay him to; but there are some men whom it might possibly ruin, and still it might not be so severe as some people imagine. In Denmark the Government gives a little grant, and if a cow is condemned by an instructor the owner gets a certain amount of money, and if it is passed by an instructor he gets whatever the butcher pays for her.

In some places they simply run a division across a cattle stable. Unless the animals were valuable, and you wished to keep them for breeding purposes, I would prefer to slaughter them, if there was a Government compensation given for these animals that were condemned. But if you have a valuable cow that you do not like to dispose of I think it is possible to keep that cow in the herd and give her calves her milk and have it sterilized; you should make a few precautions. That cow should be kept separate from the rest and the man that goes in there to attend that cow should not come right out with the same clothes on and the same boots into the other stable. He should attend to his healthy animals first and then go to the infected stable and put on a blue smock over his other clothes and a loose pair of rubbers, and when he gets through he should take off his smock and his rubbers and wash his hands.

Q.—Do you keep the cow separate in summer as well as winter?

A.—Yes. There is no more danger; but all the same I would keep them separate.

Q.—Surely an ordinary partition is not sufficient?

A.—It is not complete. The man who is most severe with the disease in the commencement gets through with it the quickest.

Q.—Is there any danger of the offspring being affected?

A.—It is very, very rare that a calf is born with tuberculosis.

Q.—Is it not inherited?

A.—No, it is a very rare thing. I believe cases have been found, but they are extremely rare. We had a calf from a tuberculous cow that had great big glands, and we thought, of course, that it was also tuberculous. We kept the calf for a little while to give it time to develop, and then we killed him and went to work to examine for tuberculosis and could not find a particle in him. It was simply an ordinary case of goitre.

Q.—Is there any danger from contamination from the bull?

A.—There might be.

Q.—Would you use a tuberculous bull?

A.—I would not hesitate to use him if he can be kept away from the rest of the herd. The manure from a reacting herd should not go into the common yard where the other cattle walk through it.

Q.—In other words, you mean to say that a tuberculous bull is not likely to cause disease?

A.—No; the chances would be very remote.

Q.—Is an ordinary veterinary surgeon competent to make these tests?

A.—Yes, if he has been shown how. Any bright fellow with common sense could learn within half an hour. Both Prof. Wade and myself have used the needle, and we are not veterinary surgeons. I think we are more careful than the veterinaries, as we disinfect the needle and the spot before making the injection. You should be very careful and use good judgment and compare the temperature carefully one day with another.

ADDRESSES OF WELCOME.

Mayor F. W. Hall: I am sure it is a great pleasure indeed to welcome to our town such a noble body of men as this that make up the Eastern Dairymen's Association. My friend Mr. Foy is also here, to welcome you on behalf of the County, so I will ask you to give me your attention for a few moments only, while I, as representative of Perth for this year, voice the feelings of the town in words from an address that has been prepared:

To the President, Officers and Members of the Eastern Dairymen's Association:

The citizens of the town of Perth feel it a great honour to have you with us at this time, this being the first occasion on which you have held your Convention here, and we welcome you most heartily. For some time we have been looking forward to your visit with eager anticipation, and we beg to assure you that our townspeople as a whole will gladly do anything in their power to make your stay in Perth a pleasant and profitable one. In my capacity as Mayor, and knowing that you will use the privilege worthily, I feel perfectly safe in extending to you the freedom of the town.

Perth, as you know, is the centre of one of the finest dairying districts in Canada, and has given some of her foremost sons to lead the van in the matter of progressive and aggressive dairying and agriculture. The famous World's Fair cheese, that made a name for Canada among the nations, was manufactured within the limits of our town. For these reasons, and others that might be mentioned, as well as because of the warm interest that is taken in dairying throughout this district, it is fitting that you

should honor us by holding your Convention here, at the dawn of this bright New Year, and we trust it may prove the most successful from every standpoint in the history of your Association. Towards attaining such a consummation the people of our town will do what in them lies, so that this occasion may be a red-letter one in your annals, and in the warm hope that we may soon have another visit from your honorable body.

We recognize the fact that your Association is doing a grand work in connection with an industry that is one of our country's strongest assets, and we feel that the result of your deliberations and discussions at these annual gatherings cannot fail to be of immense benefit to all who have that industry at heart. That this result may accrue during your present Convention is assured by the many men of prominence who are with you this week, and whose addresses are sure to send visiting dairymen home better fitted to achieve success in their calling than they were before.

Again assuring you how warmly we appreciate your visit, and offering you the best the town affords, and "A hundred thousand welcomes."

On behalf of the citizens,

F. W. HALL,
Mayor.

Perth, 4th January, 1911.

REEVE C. J. FOY: I am indeed proud of this occasion which affords me the opportunity of welcoming you in the name of the Corporation of the County of Lanark.

When we first approached the subject of having the Association meet in our midst it was thought that the project was just a little too large for us to handle; but knowing the people of Perth as I did, we determined that there was nothing too large for the town. (Applause.) And we went out for this Convention, and I am proud and happy to see that we were successful in getting it. I wish to pay my respects to your Executive for the manner in which they dealt with the matter. I think no more opportune time or place for holding the Dairymen's Association could be found in the Province than in the good old town of Perth. We have been pioneers in agricultural industry. Our station on the C. P. R. is the biggest exporter of agricultural products on the line of the C. P. R. from Toronto to Montreal, and that is saying a good deal. We are producing to-day some of the best agricultural products that are raised in Ontario. Not only do we produce the finest articles from the soil, but we have produced men who have made and are making the history of agriculture throughout the length and breadth of this Province. We have given you the finished product in Mr. J. A. Ruddick, who occupies an honorable position at Ottawa, and we have given to you a man who has also done great things in the interests of dairying, and that is Mr. G. G. Publow. (Applause.) We have also given you Dr. Publow, of Cornell University, his son, and a chip off the old block. We have given you Mr. Echlin and the Singletons, father and son. We point with pride to all these people as we see them progress and advance in the agricultural pursuits of this country.

I told you you were coming to a town that met the stranger within her gates with open arms. We were confronted with the objection that Perth would never be able to house the crowd that would come here. I assured the delegates that we would be able to house them, because no man has ever gone hungry in this town, and no stranger has ever gone dry. (Laughter and applause.) You have had magnificent audiences and great enthusiasm. We extend to you the right hand of fellowship. I hope and trust your stay will give you both pleasure and profit, and we will look forward to the return of your Convention to our midst in the near future. (Applause.)

THE CHAIRMAN: I am sure we are delighted with the reception, and while it has been both poetical and strong, it does not at all compare with the reception

we got last night down in Col. Matheson's. I want to say we are perfectly delighted with the reception we have had from the citizens of the town. We are delighted with the audience you have furnished, and we are particularly delighted to-night to see the fair ones out in such large numbers and with great beauty. I am sure on behalf of the Eastern Dairymen's Association we accept your kind wishes and hospitality so beautifully extended, and we will take pleasure in the next few days of using this hospitality that you have so generously offered to us. I am sure we are going to have a historic Convention in this grand old town of Perth. We are delighted with the men who have come from this place, and who are doing such great work. Twenty-six years ago, when I was visiting the factories in this vicinity, I dropped into the Riverside Factory, and I found a little boy, smooth faced, with his fair hair parted neatly, his hands clean, and with cheese that were just exactly uniform. The floor of the factory was clean, and everything around was in proper shape. "How much are you getting here, my boy?" I asked him, and he told me. I told him to do the very best he possibly could until the fall, when I believed the Eastern Dairy Association would hire him for twice as much money as he was getting, and we would have him as our instructor, so that he could help to put the other factories up to the high condition that that one was in that day, which was the best that I had ever seen. I am sure we all remember the time when our good friend Publow started on the road, and how he has grown since that time (applause), how the dairy institutes have since multiplied, and how the quality of our goods has been better every year. We are delighted with the goods you make here, and I am sure we were delighted when we accepted the invitation to meet in this good old historic town. Again on behalf of the Dairymen I thank you sincerely for this cordial reception.

I have now great pleasure in introducing to you the talented Deputy Minister of Agriculture for the Province of Ontario, a man who has done more than any single man for the uplift of Agriculture, not only in the Province of Ontario but on this continent. We are delighted to have him with us. I have much pleasure in introducing him to this audience.

ADDRESS.

Hon. Col. Matheson, Provincial Treasurer, Toronto.

I feel that I must, in introducing my subject, first join in the general welcome to our visitors. We are glad to see you, and all I can say is that you are most heartily welcome, and I am satisfied that our own people will reap a benefit from your visit, in a manner that they hardly expected.

This is the town that is the home of the big cheese that weighed eleven tons—22,000 pounds. It was made in the freight shed down at the station here. It was the two days' product of the milk of eleven factories surrounding Perth. It was brought in here in the shape of curd, made into cheese and shipped to Chicago. I saw it there. Then it went to England, and I tasted a piece of it when it came back two or three years afterwards. It was a piece about the size of my finger, and it was pretty strong by that time. At the same time it was a great advertisement for us.

In Eastern Ontario we have 964 cheese factories. Dairying is pre-eminently the leading agricultural industry in Eastern Ontario, and the Perth district is

looked upon as one of the most progressive sections in this line, being known in the markets of the old world as a producer of cheese of uniform quality and high grade.

Marked advance has been made in the average production per cow during the past few years. The farmers generally are appreciating the necessity for growing suitable crops for the feeding of their cattle during the dry periods of the summer and fall, as well as for providing for better care of the cattle throughout the winter months. All this means prosperity to the country at large. Of our 1,173 cheese factories, 965 are in Eastern Ontario and 208 in Western Ontario. Of the 115 creameries, 36 are in Eastern Ontario and 79 in Western Ontario.

The number of factories in some of the surrounding counties are as follows:

	1900.	1910.
Carleton	60	65
Lanark	44	47
Grenville	39	44
Leeds	82	99
Frontenac	69	74

The appropriation of funds to enable the Department of Agriculture to give instruction free of cost to the factories has had a marked influence in dairy advance. When the factories were required to make application for assistance and pay a portion of the expenses incurred, the poorer class of factories did not take advantage of the services of the instructors. Since all factories and creameries are visited and receive equal attention from the instructors, there has been established a uniformity which did not previously exist, and the average quality has been bettered.

Legislation requiring the factories and creameries to be kept in good sanitary condition has been a factor in quality improvement.

The sending of special speakers to attend annual meetings of cheese factories has had a marked effect in improving the general quality of the raw material delivered to the factories. Instructions as to the care of milk and cream on the farm have been printed by the thousands and distributed through the instructors from season to season.

Provision has now been made for the granting of certificates to makers, beginning with 1911, before they will be allowed to take full charge of the manufacture of cheese and butter. This will, no doubt, place the industry upon a better basis and strengthen the position of the competent maker.

The following comparative statements as to expenditure on account of dairy instruction, dairy schools, grants to associations, and factory meetings, will be of interest.

STATEMENT OF NET EXPENDITURE.

——	1901.	1905.	1910.
	$	$ c.	$
Dairy Instruction	4,000	32,841 47	39,065
Dairy Schools	12,200	13,292 74 (3 Schools)	13,000 (2 Schools)
Dairymen's Associations	4,000	4,000 00	4,500
Factory Meetings	.....	.....	490
Net....	$20,200	$50,134 21	$57,055

With twelve hundred and eighty-eight factories and creameries served by the dairy instructors, dairy schools, and dairymen's associations, the expenditure, as will be seen, is about $45 on account of each factory. This means an expenditure on account of dairying in Lanark County, with her forty-seven factories, of $2,115.

STATISTICS *re* DAIRY CATTLE.

—	Milk Cows. 1900.	Milk Cows. 1909.	Value.
	No.	No.	$
The Whole Province	976,124	1,075,496	41,077,721
Carleton	34,255	35,890	1,384,041
Lanark	24,724	25,417	871,041
Grenville	21,265	20,480	695,910
Leeds	34,011	32,580	1,125,965
Frontenac	24,806	31,818	1,066,539

I think this Dairymen's Association is doing splendid work every year, and I am satisfied that if we have the revenue to spend we cannot do better than to give you some more. I am not making any promise. We have so many demands for hospitals and good roads and for opening up the north country where the Grand Trunk Pacific is going through, education, and various other things to which the Government has to contribute, and we have to look carefully as to where the money is coming from. This last year we just made ends meet. I think we have three or four thousand dollars over, and we have increasing expenses to meet for the coming time. You must consider these things when you are making demands from the Government.

Someone has advocated reciprocity in cheese. I do not think you will get so much more in the States as you think. One or two men might do it. A small quantity might do it, but you are going to destroy your whole market here, and have cheap American cheese instead of your better cheese. Remember, you are competing with New Zealand, who are shipping cheese to the British market. The British workman is better fed to-day than he was some years ago; he eats more meat and less cheese. They are getting meat now from Australia, New Zealand and Argentina, and the British workman is eating a larger portion of meat. All that means that you have to consider the change that may come, and you may not get the market that you hope for. There is also an opportunity for you to try and vary your business by sending some of your products in the shape of milk and cream to the cities. That is the best paying part of the dairy business.

Last summer I went up to the town of Simcoe in the county of Norfolk, about six miles from Lake Erie, and I drove out to see a fruit farm that was just planted. I was taken to a farm of 40 acres, of which 30 was orchard that was sold some years ago for $2,000. Five years ago it was sold for $4,500, and it was sold to the best apple expert in the county of Norfolk last year for $17,500. (Applause.) That man trimmed the trees, sprayed them three times a year, and cultivated the soil and he expected this year that he would take $9,000 off of that 30 acres of orchard, and his expenses in connection with the spraying and cultivation will not be over $2,500. He expects to get $6,500 clear in one year on his investment of $17,500. That is what fruit means, and you can plant it in this country and in the counties to the south. I have bought good apples grown in North Lanark, and I believe that many of the orchards in this county can be increased by spray-

ing and pruning and cultivating the soil. I think all our farmers might be progressive when the way is pointed out to them, and they could easily change their old system. In the dairy business you must try and get the very best product that can be made. I thank the Dairymen's Association for coming to Perth and giving us the benefit of their experience. (Applause.)

ADDRESS.

C. C. James, Deputy Minister of Agriculture, Toronto.

Sometimes the question is asked: "What is becoming of this old Province of Ontario?" The three Prairie Provinces in 1909 in their field products came within a short range of the old Province of Ontario. In 1910, however, there is no doubt as to where we stand. The figures which have been put out lately are as follows: During the year 1910 the field products of Ontario amounted to about $203,000,000, and the combined field products of Manitoba, Saskatchewan and Alberta totalled about $155,000,000. We said last year at the Dairy Convention that "Ontario was then all right." We can say this year with still greater force "Ontario is still all right." And yet we must not be satisfied. We must consider our present position. What are the outstanding features in connection with agriculture in Ontario? What is there for us to do? Not only must we maintain the position that we now have, but we ought to strive to improve upon it.

There are three or four things which stand out clearly and prominently to-day before the people of this Province. The first is that there is a better outlook for the owner and breeder of pure-bred and high grade stock to-day than ever before. If we are in this agricultural business in earnest, and if it is our life work, we ought to look at these questions clearly, and then sit down and carefully discuss the situation. What are the lines along which we are most likely to succeed? What has been happening with regard to live stock during the last two and three years, particularly during the past year? We have seen buyers from the Western Provinces come into Ontario in 1909, and again in 1910, and take out of these Provinces all the valuable horses that could be bought up, until at the present date good, serviceable work horses and road horses are commanding a price which they never did before.

The second point is whether or not we shall redouble our efforts. You will remember that when the McKinley tariff was put up as a wall against the products of the farmers of Canada, among the articles included was eggs. We then had a large surplus. Eggs were going in large quantities across the American line to feed the people to the south of us. But what have we found? There has been a great increase in the home demand by the building up of our towns and cities. Through the increased demands of the cities East and West we have not only got rid of that surplus of eggs, but we have a deficit. During the past two years we have drawn for our surplus supply on Russia to the East, and China to the West, and quite recently upon Germany. Is it not a most extraordinary thing that an agricultural country like Canada and an agricultural Province like Ontario are not able to supply enough poultry and eggs for our own people.

Take the question of fruit. A most extraordinary change has come over this Province in the last few years. We have had great markets across the ocean—England Ireland and Scotland, and occasionally some countries on the Conti-

nent, take our surplus fruit, provided we send it of first-class quality, and put it up in a satisfactory manner. Too often we have sacrificed that market by our eagerness to put inferior stuff upon the market and put it up in an inferior manner. But while we have that market available all these years, there has gradually been opening up in the Western Provinces a market which seems to be almost unlimited in its capacity. In Northern Ontario, also, another market is springing up. The result is that there has been a growing demand for our best fruit. The people of Toronto, Hamilton and London have gone to their grocers and their merchants to get first-class apples, plums and peaches, and again and again they have been met with the statement that the number one fruit has gone out of the Province to the West or to the North or across the ocean, and the result has been impossible prices in the home market. What does that mean? It means that those who are closely and carefully watching the demand of the great markets to which we have access are beginning to take advantage of that situation, and as a result there are counties in the western part of the Province where new orchards have been planted, not by the acre or by the ten acres, but by the hundred acres. Some people know that this land in Western Ontario is peculiarly adapted to fruit-growing, and they are getting ready for that increasing demand. A calculation was made by one who went very carefully into it—and he got his figures directly from the nurserymen—that in the Province of Ontario during the last year there were set out very nearly two million apple trees. Some of these trees have been set out in Eastern Ontario; but the report that we get does not indicate that there is yet in Eastern Ontario any considerable attempt being made to meet this great demand that is coming in the future for Ontario fruit.

There are two things, then, that I would like to impress upon you along that line. That is, those who are watching the present and preparing to meet the demand of the future, particularly in Western Ontario, have been setting out orchards in large areas, knowing that by the time these orchards will come into bearing the markets of the West will have increased four or five or perhaps ten-fold. That is the kind of shrewd business ability that has been found to work out so well in our towns and cities. Why should it not also apply to those who are working on the farms in this country? Look ahead. Plan for the future; not simply sowing to-day to reap to-morrow, but planning to-day so that five, ten or fifteen years hence they may be able to reap rewards of their work and hand down to their children, if not to their grandchildren, a very rich and profitable heritage.

The most extraordinary thing of all is that while this future demand is being made we find that over the Province of Ontario the old orchards which, perhaps, fifteen, twenty or twenty-five years ago were more or less profitable have been neglected and allowed to go into ruin and decay. Some of the owners of these orchards are now turning to them to see whether or not they can be revived; and that is a point which the farmers in Eastern Ontario ought carefully to consider.

The fruit-growing possibilities—especially the apple-growing possibilities—of Ontario are not by any means confined to Western Ontario. The fact is there is hardly a section of the settled southern portion of old Ontario that will not produce some variety of apples to perfection; and from what we have heard and seen and from what we have learned from investigation, there are considerable areas here in the Eastern part of the Province of Ontario that are adapted to the growing of certain varieties of apples that will meet ready demands in years to come. Therefore, while you are engaged in the dairy business it behooves you, I think, to turn your attention to these old orchards, to see whether it is possible to get out of them a revenue, or to add to your annual revenue; and also to consider

whether or not it would pay you to set out a young orchard, so that when you hand your farm over to your son it will not only be a dairy farm but will produce a sure income from the apple orchard.

Then, what about our dairy industry? The Province of Ontario is building up a very fine reputation for her dairy products. There is no better butter produced in the world than that which is produced in the Province of Ontario. I do not say all the butter is of the finest quality, but we can make the best butter that is produced in the world, and so with our cheese. We have attained very high excellence in the manufacture of cheese. But there are two or three things about that which we ought to consider. The first is that all of our butter and all of our cheese do not come up to the highest standard; and the second is that it is very doubtful whether we are carrying on our dairy industry with that careful business exactness that is absolutely necessary for the carrying on of a successful business.

If you will allow me, I shall give you some figures I have here compiled from forty different factories located in the Eastern part of the Province of Ontario for the past year. The problem of manufacturing cheese and putting it on the market at a profit, and getting the highest prices satisfactory to the patrons, is far more complicated than nine-tenths of the business propositions in our cities. I want to say that returns of this kind ought to be given the most careful study by the best brains in this country. The dairy industry is the biggest single manufacturing industry that we have in the Province of Ontario. There are more people directly concerned and there are more homes interested than in any other line of manufacturing in the Province of Ontario; and if we are not very careful before long we will be up against one of the most serious propositions that has ever faced this Province along the lines of manufacturing.

I find, for instance, that the average selling price of cheese from these forty factories varied from 10 7-8c. up to just a fraction over 11c. The first thing that strikes one is that the general price of cheese is not, for some reason or other, keeping pace with the general increased price of the commodities in this Province for the last ten years. I do not think that there has been during the past ten years the same relative increase in the selling price of cheese that there has been in regard to most of the other articles of consumption. Some one may ask: Why is that? I cannot answer that, right off hand; but it is a matter of vital concern. There are not only hundreds of thousands, but I was going to say almost millions of dollars, concerned in a statement of this kind.

The cost per pound of manufacturing in these forty factories varied all the way from 4-5 up to 2 1-5 cents per pound. Can that variation be found in any other line of produce manufactured in Ontario to-day? This variation from 4-5ths of a cent up to 2 1-5 you have only to multiply by hundreds of thousands of pounds to find out that it amounts to a very large sum indeed. Local conditions, of course, will account for some of it, but we ought to get down to a careful study of these things, and if there is a remedy let us apply it. If 2 1-5 cents are too much, what a wonderful increase there would be in the receipts to the patrons if we could bring that down to 2 or 1½ or 1 cent. The majority of these factories give 1¼ cents.

A Member: One includes hauling and the other does not?

Mr. James: Will that explain it all?

The Chairman: Yes. And the other is where the patrons own the factory, and they hire the cheapest fellow they can get, and he goes in and makes it for 4-5ths of a cent, and beats everybody concerned. (Applause.)

Mr. James: That simply illustrates what we ought to do, and that is to get down and carefully study the exact facts in regard to all these things. (Hear, hear.)

Here is a column showing the number of cents that a patron gets per one hundred pounds of milk, and it varies all the way from 82.3 to a little over 96, and that is where it touches the pockets and touches the homes of the people of this country; whether they are going to get back for the milk they are producing 82½ cents or 96 cents, or more. I wonder if it would be any consolation to you to know how much per hundred pounds of milk we are paying in the city of Toronto? We are giving nine cents a quart. Figure that out, and compare it with your 82½ cents. Some one may say that the difference between the cost of production and the cost of putting these goods on the table of the consumer is too far apart; and that brings me around to the one general question that I want to take up here, and it is one that we have to face in this country and face it seriously. It comes into all these lines—poultry work, live stock markets, the dairy markets and the fruit markets—and it is the great question of marketing so that the producer will get a fair amount of the ultimate value of his goods. This question has been coming before us for years, but it seems to me that it is coming with greater and greater force all the time. Those of us who are consumers, and live in the city, have been rather restive under this situation for a number of years as we have seen the prices of milk and poultry go up. We ask: When is this thing going to stop? We come to you and find you discussing these things, and complaining, and saying: "Look at the prices which the consumers are paying and look at the prices we producers are receiving." There is a great question in political economy that has to be worked out in this country, and we ought to get working upon it with the best brains of our most energetic and earnest people.

I do not think it is right and proper to leave these things simply to be settled by themselves. If there is a better way of doing these things we ought to know it.

The fruit men in Western Ontario, in particular, have taken hold of the question in a co-operative way, and they have solved it up to one point, although they have not absolutely removed all the difficulties in connection with it. These are things which concern not simply the producer but the consumer also, and the people in the towns and cities are as much concerned in the price of butter and cheese, eggs and milk and bacon as are you who produce these things upon your farms.

In the development of our agricultural problems we are coming into a new era. In the olden days the practice was to send a man to stand up and talk and advise the farmers, and if they did not accept that advice they came back again and gave the members the same old advice, and we began to wonder why it was that our dairying, our fruit crop, and such other farming industries were not improving. You may talk from the 1st of January to the 31st of December to the majority of people about what and how to do things, and they won't do it. You know that a preacher can stand up and preach, and preach, and preach; but unless he can set an example, and those who are working with him, his preaching will have little or no effect. The day of preaching improvement in agriculture has gone by. We have done about all we can in the way of advising people from the platform, and by a printed book or pamphlet, unless back of that and along with it we have got the example. And so during the last few years we have been trying to shape our work along these lines. We initiated this at first in connection with the great dairying industry, and I suppose it was largely out of the success we made in connection with the dairy instruction that we broadened out and have

taken other lines of work. We gather together in these rooms forty or fifty or one hundred cheese and butter makers, and Mr. Publow and some of his staff stand up and talk to them about what they should do. That is all very well in its place. But if you can send some person who is an expert, and who will show you how to do these things, how much more effective his advice becomes. And so we have thought that if we are going to improve along other lines we must follow out similar plans, and for the last three or four years we have been sending out men among the fruit-growers to show them how to prune their orchards, how to spray them, and how to pick and pack and ship the fruit. We are doing the same thing to a certain extent among the poultry men, and we have received a rich response on the part of the farmers of the Province. (Applause.) As to how far they shall go and succeed depends first upon having a man to do the work. We have a general organization; we have a college for training these men. We can produce them in limited quantities, but unless these men have the support and backing and sympathy of those directly concerned in the business they will work not only with discouragement but with failure staring them in the face. What we want is that this work shall have your hearty support. I can take you to several sections in the Province where this work has been encouraged, and where men who have the interest of the country's agriculture at heart have gone in and moved the work on with rapidity. I simply say to you here that if you want the agriculture of the county of Lanark to be increased and developed all you have to do is to take hold of these forces which are placed here at your disposal and help on the work that is being carried on in your midst. (Applause.)

It is not a question of glory for the Department of Agriculture or any Government. If that were so the money could probably be spent to better advantage along other lines. There is just one thing in view, and that is to help develop here in the county of Lanark the very best type of agriculture that is possible in the Province of Ontario. (Applause.) You may say, what does this mean? It means everything so far as the people of the county of Lanark are concerned. There is no farm in the county of Lanark to-day that cannot be increased in its income any way from one hundred to a thousand dollars if you put into operation these things which you have been told and read about, and which you know about. And that would not mean simply the people living in the country would be benefited. There is no storekeeper, or professional man, or a retired farmer living here in the town of Perth that would not be benefited by the development and uplift of the agriculture of your county. It is not a matter simply for the people in the townships. It is a matter in which the whole county of Lanark—townships, towns and villages—are concerned, and efforts should be put forth to assist, through the Agricultural Societies, Horticultural Societies, and Dairymen's Associations or the Farmers' Clubs. There is not one of these Associations in which you are not interested, and to which you cannot give help and support. We want these $203,000,000 worth of agricultural field crops built up and increased to $300,000,000. All you have to do is to increase by 50 per cent., and it is done. It can be done, but unless you do your share it will not be done. That is the reason why the Government through the Department of Agriculture have started in your midst the work of Mr. Hamer. There are scores of farmers in this audience to-night who knew just as well before as they do now that under-draining a field is profitable; but the work was not done because there was wanting that little initiative which seems to be so necessary. You know that a better class of seed will give you better crops; but why is it that we are not all using the very best of seed? You know that there is just as much difference between inferior seed and good seed

as there is between an old skate that goes along the road and a first-class Clydesdale; and yet some of our farmers are satisfied with inferior seed. It is a hard task to get our people to work these things out. We all know how to be good farmers, and we ask all you people of the county of Lanark that you will take this question right home to yourselves, and that you will give your hearty support and co-operation to all the efforts that have been initiated for the improvement of the agriculture of the Province.

ADDRESS BY MR. HULL.

THE CHAIRMAN: We will now hear Mr. N. P. Hull, Dimondale, Mich., President of the American Dairy Farmers' Association. He is from the Wolverine State, and he is going to address us on the building up of a dairy herd and the caring for cows. This is a most important subject, and I have very great pleasure in introducing to you our friend from the American side of the river to the good people of the town of Perth.

Mr. Hull then spoke for an hour, and was listened to with close attention. His many stories delighted the audience, and he was frequently applauded. His address appears in the report of the Western Dairymen's Association for 1910.

REPORT OF DAIRY INSTRUCTOR AND SANITARY INSPECTOR.

G. G. PUBLOW, KINGSTON.

It is with pleasure that I present my eighth annual report on the work of Dairy Instruction and Sanitary Inspection in Eastern Ontario.

The work of instruction and sanitary inspection in 1910 was conducted along similar lines to that of last season, with the exception that this year special attention was devoted to the improvement of the sanitary conditions under which the milk was produced.

There was no change in the staff of instructors from that of last year, and they were allotted the same districts with the exception of a slight rearrangement of factories in some of the syndicates, and following the custom of the past few seasons they attended a ten days' course of instruction at the Eastern Dairy School before commencing the season's work. During the course they were given special lectures in dairy chemistry, bacteriology, and factory sanitation, as well as in cheese and butter making. In addition, each instructor was supplied with a lactic acid culture and alkaline solution of standard strength, and this has proven to be a very important factor in securing a uniformity of quality in the products throughout the different districts.

Rather than take up the valuable time of this Convention with a detailed statement of the work in each syndicate individually, I have prepared a tabulated statement in which will be found, in condensed form, a general outline of the existing conditions and what has been accomplished in each group.

There were in operation this year 933 factories, which is 19 less than last season, and these factories received from their regular instructors full day visits to the number of 1,479 and 5,386 call visits, and, in addition, they received 335 visits from Mr. Singleton, my assistant, or myself, which makes a total of 7,200 visits.

I am pleased to report a very great improvement in the sanitary condition of the cheese factories, as of the total number of 933 regularly visited, only 86 were reported as being at times in a rather unsanitary condition, and we have been assured that the majority of these will make the necessary improvements before beginning operations another year.

There were 15 new factories built during the past year, and 581 made improvements in buildings or plant, the estimated expenditure, including new buildings, being $123,260.00.

Regarding the equipment of the factories, I would say that their weakest point is still the lack of proper facilities for controlling the temperature of the curing rooms throughout the different months of the year, as there are only 53 factories out of the total 933 that are properly equipped in this respect. This is a matter that is deserving of much greater attention on the part of factorymen than it receives, as the having of these conditions makes it possible to turn out cheese of more uniform quality from month to month, and, besides, it gives the factoryman an independence in many ways which he does not otherwise enjoy.

With the large majority of the factories in a satisfactory sanitary condition, and realizing the great need for better sanitary conditons under which the milk is produced, we made a special appeal to a large number of the patrons to see what could be accomplished in this respect. Three thousand and seventy-one patrons were personally visited by the instructors with this object in view, and of this number the instructors succeeded in having 657 whitewash their stables. This was not accomplished without a good deal of opposition, but in practically every case where it was done the patron expressed himself as being well pleased with the results, and now that a start has been made it is to be hoped that this good work will be extended.

The number of patrons delivering milk to the cheese factories was 33,328, and the number of cows from which milk for cheese-making was obtained was 319,967. The average yield of milk per cow for the six months from May 1st to November 1st was 3,253 pounds, which is an increased yield of 390 pounds per cow over that of last season, and the average per cent. of fat in the milk for the six months was 3.64 per cent.

The total output of cheese from May 1st to November 1st was 97,253,407 pounds, which is 7,082,533 pounds more than the output for the same period last season, or, allowing 85 pounds as the weight of a cheese, there were 83,324 more boxes of cheese produced than last season.

Regarding the quality of the cheese, it is gratifying to be able to report that, notwithstanding the critical inspection which they have received, the May and June makes were reported as the best in the history of the trade, but as soon as the warm weather set in complaints began to be received regarding flavor, texture, and closeness. The openness was largely due to insufficient maturing of the curds before salting. The coarseness of texture was mainly due to too heavy salting of the curd, and the receiving of overripe milk, and in some cases to the treatment given in its manufacture. The makers, in a number of cases, claimed that they were forced to receive milk of this character owing to the keen competition that existed between factories. The receiving of overripe and tainted milk not only affects the quality of the cheese, but results in serious loss in yield as well, as will be shown by the result of the following experiment conducted by the officers and patrons of Rapid Valley Cheese Factory, and I do not know that I can do better than give the report as received from the Secretary, which is as follows: "After several discussions on the subject of 'cooling milk,' the patrons of Rapid Valley

Factory passed a resolution at their annual meeting that all night's milk be delivered at their factory in 1910 must be properly cooled to 60 degrees, but as this failed to be carried out by all the patrons, five of them agreed to cool their milk down to 60 degrees and deliver it practically at this temperature. This they did for three days—June 15th, 16th, and 17th, which were extremely warm days. They delivered 9,973 pounds of milk, which made 925 pounds of cheese, being an average of 10.77 pounds of milk per pound of cheese. The remaining 13 patrons delivered 13,956 pounds of milk at a temperature of about 80 degrees, which made 1,188 pounds of cheese, being an average of 11.75 pounds of milk per pound of cheese, which shows a loss of 107 pounds of cheese, or, at 11 cents per pound, a loss of $11.77 to the 13 patrons in the three days. These results encouraged more of the patrons to join in the good practice, and they agreed to pay the maker $1 per day extra for a month to make up separately all the milk delivered, at a temperature not above 70 degrees. This experiment was conducted from July 18th till August 19th. During this period 144,480 pounds of cooled milk was delivered, from which was manufactured 13,093 pounds of cheese, being an average of 11.03 pounds of milk per pound of cheese. The amount of ordinary cared-for milk delivered was 53,806 pounds, from which was manufactured 4,656 pounds of cheese, showing an average of 11.55 pounds of milk per pound of cheese. All the cheese was sold at the same price, 10.68 cents per pound. The ordinary milk netted 83.80 cents per 100 pounds, the cooled milk 87.76 cents per 100 pounds, showing a gain for the cooled milk of 3.96 cents per 100 pounds, or $57.21 in favor of the cooled milk for one month, due to yield alone."

While there is a marked improvement in the condition in which the milk is being delivered at the factories, yet, during the warm weather, there is quite a large percentage of the milk that shows a lack of proper care, as from 4,153 curd tests made by the instructors, 2,136 samples showed to be overripe or tainted.

I am pleased to be able to report an increase in the number of factories that practise the pasteurizing of the whey, there being 125 doing so this season as compared with 63 last season.

The average acidity of the pasteurized whey was 34 per cent., while that of the unpasteurized was 1.08 per cent.

Pasteurizing the whey, when properly done, has much to commend it. The whey is returned in a much sweeter condition, there is a more even distribution of the fat, and where the whey is returned in the cans in which the milk was delivered, the cans are much more easily cleaned, and it also prevents the whey tanks becoming the seeding centres of undesirable fermentations.

Regarding the manufacture of whey butter, I have to report that there were 133 factories engaged in it this season, as compared with 119 last season, and the total amount of whey butter manufactured from May 1st to November 1st was 422,022 pounds.

A new feature introduced into some of our factories this season, and one which has created a good deal of discussion among factorymen, and which, from present indications, is likely to increase, was the shipping of cream and casein to the United States. In all, 41 factories were engaged in this work at the close of the season.

The testing of milk for deterioration was also conducted by the instructors, and they reported 137 samples as showing evidence of having been tampered with. After a careful investigation, 96 of these cases were placed in the hands of the official prosecutors to be dealt with. Convictions were secured in all cases and fines ranging from $5.00 to $50.00 were imposed, amounting in all to $2,850.00.

This is one of the most disagreeable features of the instruction work, and the remedy for it lies in the payment for the milk according to quality, which I consider is the proper thing to do, for it would remove the tendency to dishonesty and would also encourage the production of milk of better quality, but it would appear that the general adoption of this system by factorymen was still a long way off, as there are at present only 93 cheese factories in Eastern Ontario that pay for the milk according to test, which is, however, seven more than last year; 70 of these factories pay by straight fat, and 23 add two to the reading.

Syndicate.	No. of factories in syndicate.	No. full day visits.	No. of call visits.	No. of patrons.	No. of patrons visited.	No. of patrons that white-washed stables.	No. samples tested for adulteration.	No. samples deteriorated.	No. of factories pasteurizing whey.	No. factories making whey butter.	No. of factories which shipped cream and casein.
Brockville E	46	76	201	1,558	87	75	1,589	3	25	15	4
Cornwall	37	50	284	1,086	95	25	967	10	15	....	5
Vankleek Hill	45	49	277	1,247	97	.....	976	8	1	....	....
Peterboro'	35	74	361	1,609	247	54	1,355	4	....	10	....
Belleville	39	78	140	1,842	104	10	1,600	2	6	..	....
Picton	36	58	286	2,923	246	39	1,981	4	16	12	....
Napanee	42	60	185	2,824	115	35	4,334	4	1	6	....
Brockville W	42	83	200	1,036	128	61	1,570	3	13	14	....
Lindsay	28	41	189	1,527	107	25	1,447	2	5	2	....
Perth	39	35	213	1,338	71	14	712	2	1	6	....
Chesterville	38	40	264	686	29	13	908	5	10	9	4
Brockville N	44	75	223	1,062	35	25	973	....	....	15	6
Finch	37	44	239	1,133	111	19	1,310	8	4	1	7
Alexandria	36	70	196	1,067	20	10	859	6	....	....	....
Campbellford	40	66	268	1,563	80	53	3,150	5	3	1	....
Kemptville	41	90	228	1,576	150	35	1,865	11	4	3	....
Ottawa W	35	41	167	1,437	145	4	484	2	5	3	....
Almonte	40	62	185	1,575	141	23	1,683	2	....	1	1
Morrisburg	42	63	231	1,213	64	28	1,464	8	2	20	10
Ottawa	36	55	279	923	212	31	859	1	1	5	3
Ottawa E	41	49	276	1,135	157	38	895	5	....	4	1
Kingston	39	93	166	1,232	132	5	1,794	9	3	6	....
Plantagenet	42	43	180	1,236	100	15	1,310	25	7	....	....
Madoc	31	80	146	930	393	20	2,451	5	2	....	....
Outside Factories	2	4	2	70	5	.....	65	3	1	....	....
	933	1,479	5,386	33,828	3,071	657	36,601	137	125	133	41

The number of creameries under our charge this season was 25. Mr. Singleton, my assistant, acted as instructor and inspector for 12 of them, the others being looked after by the cheese instructors in whose groups they happened to be located.

They received during the season 26 full-day visits and 84 call visits, making a total of 150 visits in all. They are reported as being in a clean, sanitary condition and well equipped for the manufacture of good butter, their weakest point being their refrigerators.

The number of creamery patrons visited by the instructors was 190, the instructors going out on the cream routes of the different creameries, and while

the cream hauler was getting his cream weighed and sampled the instructor had an opportunity of talking with the patron regarding the care of the cream and separator. This results in a considerable amount of good, particularly where the cream is being delivered too thin and of poor flavor, which are the most common defects. I might say that in practically every case the instructors were well received, and the patrons expressed their appreciation of the instruction given.

While we have been unable to obtain full statistics, it would appear, from the reports which we have received that the number of cows from which cream was

Average loss of fat in whey.	Average percentage of fat in milk from May 1st to Nov. 1st.	No. factories paying by test.	No. of cows from which milk for cheesemaking was obtained.	Average lbs. of milk per cow for 6 mos., from May 1st to Nov. 1st.	No. lbs. of cheese made from May 1st to Nov. 1st.	No. factories having cool curing room.	No. new factories built.	No. factories making improvements in buildings or plant.	Estimated expenditure, including new buildings and general improvements.	No. factories kept in a sanitary condition.	No. new silos built.
									$		
.21	3.57	4	16,290	3,046	4,526,863	1	1	29	8,550	43	29
.20	3.89	15	12,700	2,884	3,472,362	.....	1	22	4,365	32	16
.20	3.70	1	13,643	3,234	4,217,532	1	.....	35	5,600	40	13
.19	3.58	12	12,319	3,385	3,792,012	3	1	25	9,759	35	23
.23	3.67	.....	16,256	3,633	5,439,766	7	.....	9	4,000	39	32
.21	3.62	.....	21,324	3,604	7,168,731	14	1	30	9,500	36	58
.22	3.68	.....	24,902	3,280	7,607,199	4	2	39	8,230	39	45
.24	3.60	4	13,554	3,764	4,675,831	3	1	21	8,550	36	41
.19	3.61	4	10,562	2,721	2,641,282	.....	.....	22	2,000	26	9
.21	3.61	.....	9,766	3,227	2,981,400	.....	1	12	4,055	34	63
.23	3.60	15	10,890	3,241	3,317,048	.....	1	21	4,000	32	118
.22	3.60	.....	13,780	3,325	3,685,864	2	.....	23	9,920	38	26
.21	3.63	.....	11,415	3,468	3,229,153	1	.....	21	3,845	33	30
.21	3.60	4	10,068	2,998	2,839,297	.....	.....	17	2,800	34	7
.22	3.57	.....	14,850	3,869	5,122,170	3	1	29	5,080	37	18
.21	3.61	9	14,842	3,155	4,333,557	3	0	38	4,000	40	52
.19	3.58	1	11,865	2,475	2,717,506	5	1	35	5,400	33	44
.19	3.54	2	13,870	3,149	4,034,518	1	.....	40	3,200	35	58
.22	3.55	.....	13,343	3,680	4,909,134	.....	.....	29	2,500	37	32
.19	3.60	8	9,635	3,194	2,922,446	1	.....	15	2,975	36	35
.22	3.66	11	11,370	3,128	3,523,656	.....	4	20	8,174	40	3
.24	3.80	1	12,953	3,426	4,103,799	.....	.....	8	900	29	29
.22	3.82	2	10,430	3,200	3,178,666	2	.....	15	3,000	36	10
.23	3.74	.....	8,916	3,204	2,692,051	2	.....	25	2,657	25	11
no record		.....	424	3,040	121,564	.....	.....	1	200	2	.....
.21	3.64	93	319,967	3,253	97,253,407	53	15	581	123,260	847	802

supplied to the creameries was about 16,000, and the total amount of butter for the six months from May 1st to November 1st was about 1,712,000 pounds, showing an average of slightly over 100 pounds per cow. The average per cent. of fat in the cream delivered was 28 per cent., as compared with 27 per cent. last season.

The number of tests made for moisture in the butter was 173, and they showed the average percentage of moisture contained to be 14.06 per cent., the lowest being 10 per cent. and the highest 15½ per cent.

The quality of the butter was reported as being superior to that of last season, but there is still room for greater improvement, particularly in the flavor.

Practically none of the butter was exported, as it was required for home consumption, and the home trade is being catered to by the factorymen more and more, owing to the high prices realized.

During the months of November and December 18 district dairy meetings were held. At these meetings the local instructor gave a report of his season's work, and addresses were given by prominent dairymen on subjects of special interest to the patrons and factorymen of the district. I am pleased to say that the average attendance at these meetings was much better than last year, and the people evidenced a much greater interest in the subjects dealt with.

Since the last Convention over 250 annual factory meetings have been attended by the instructors and myself, and applications are in for speakers to attend a large number this winter.

One of the most encouraging features in connection with our work is the lively interest and enthusiasm shown by the patrons and factorymen in the subjects dealt with at these meetings. Many of the patrons were disappointed this year with the prices realized, and from their discussions of this subject at their meetings it is evident that in the future they are going to direct their attention to the best means of lessening the cost of production and marketing of their products.

Notwithstanding the lower prices obtained this year, the loss was almost compensated by the increased yield per cow over that of last year, and many of the farmers have awakened to the fact that it is by improving the quality of their herds, better feeding, and better care of the milk and cream that they are going to place their business on a more profitable basis, and I believe that in the future there is going to be a more definite relationship between the cost of production and the selling price of the dairy products.

In closing this report, I would like to express my appreciation of the services rendered by the instructors. They were at all times faithful in the discharge of their duties, and that this has been the most successful year of our instruction work is largely due to their excellent work in their respective syndicates.

Rev. Mr. Scott: A few years ago I was travelling from Canada to Scandinavia, and I took a steamer from New York that was destined for Copenhagen, Denmark. My destination was Christiansand, and I waited for the coast steamer to take me through to Christiania, the capital of Norway.

While in Christiansand I had an occasion to meet a number of gentlemen at the noon-hour, and, knowing that I was from Canada, they asked me a number of questions. Announcing that I was from Perth, they became very specific, and asked me did I know a man by the name of Publow. I said that I knew a number of Publows in Perth. They said that this was G. G. Publow, the cheese man from Perth, the place where the big cheese was made that took the prize at the World's Exhibition in Chicago. I said, "Yes, Mr. Publow is a member of my congregation in Perth." And those gentlemen and I were friends from that time. I desire to compliment Mr. Publow on his admirable address, and I desire to take this opportunity to say that you have in Mr. Publow a capable, honest, and independent man. (Applause.) Having been born on a farm, I take great interest in agricultural matters, and, owning a little piece of soil in my own native county at Glengarry, I want to be a member from this date of your Association, and I want to be a helper to you and to myself in the work you represent. (Applause.)

The Chairman: I am sure it is very gratifying to the dairymen of Ontario to hear such testimony as we have just heard of the worth of Mr. Publow. I am glad that the big cheese brought the attention of other parts of the world to Canada.

A MEMBER: I would ask Mr. Publow's opinion on a question that causes considerable discussion through the county, and that is with regard to paying for milk by taking into consideration the casein just as well as the fat.

MR. PUBLOW: We have to face that sooner or later. So far as our own work at the Kingston School is concerned, it would lead us to believe that we should pay by the straight fat. All the work that we have done in the yield of cheese per pound of fat would lead us to believe that, all things considered, we should pay by the straight fat. It is most unfortunate that after all the years of instruction we have had that we should have so many cases to prosecute. The Dairy Association has been obliged to employ two official prosecutors, and they paid them a salary of $60 a month and travelling expenses, and also lawyers' fees, and this year the Association stands three hundred dollars to the good from their half share of fines, after paying for these men and other expenses.

SENATOR DERBYSHIRE: I think we have been well served by Mr. Publow and our instructors. They have done more and better work than ever before, and I am satisfied that there is a better feeling in Eastern Ontario in connection with the instruction work than at any other time. I think the instructors should devote more time to the farmers than to the cheese factory, because the factories are now in pretty good shape, as the makers are pretty well prepared to handle the milk.

A MEMBER: I think Senator Derbyshire has struck the keynote. I do not know how we are going to expect a lot more work from our instructors with the amount of money they are getting for it. I believe they are the poorest paid body of men we have in the Province. The idea of asking them to work for a thousand dollars a year and pay their own expenses.

MR. AYER: Do you not find some complaint among the dairymen regarding their milk going in one common lot? For instance, take a herd of Holsteins; they will test 3 to 3.5 per cent. fat. Another man may have an Ayrshire that will test 4 to 4.5 per cent. of fat. I think Senator Derbyshire has struck the point as to what the instructors ought to do. Get out among the farmers and show them better methods of caring for milk.

MR. PUBLOW: They are not all satisfied. Never in the history of the instruction work was such interest taken in regard to it as at the present time. The farmers are beginning to realize the need of conducting their business on a more scientific basis, and the work is bound to grow.

SENATOR DERBYSHIRE: It is as if one man has a cow that gives five thousand pounds of milk, and he sells it for $125, and another man has a cow that he can only get $85 for, and rather than have any trouble in the neighborhood they divide the total sum between them equally, and go off and have a cigar together. (Great laughter.)

A MEMBER: Is whey butter branded as whey butter, or is it sold under the name of creamery butter?

MR. PUBLOW: It is not branded.

MR. SIMPSON: I would like to ask with regard to paying for cheese by test. It is said by many people that richer milk gives more cheese.

SENATOR DERBYSHIRE: Can you make as much cheese out of milk at 3.5 per cent. fat as you can out of milk at 4.5 per cent.?

MR. PUBLOW: That depends to a great extent on the milk. It has been shown that there is a difference of one pound of milk per pound of cheese more required when the milk is badly out of condition, and I would say that there is a greater loss to the farmers by having milk in poor condition than almost anything else.

A MEMBER: Would it be possible in handling that rather poor milk that the maker would be able to retain a little more moisture in the cheese during the process of making?

MR. PUBLOW: The great difference is due to the condition of the milk.

SENATOR DERBYSHIRE: The milk being the same and the maker's skill the same, with a larger percentage of cream, can you make more cheese and of better quality?

MR. PUBLOW: Yes.

A MEMBER: You take one patron with 3.7 per cent. milk and another with 5 per cent. of fat. This is actual work I am quoting. The patron that is sending in 5 per cent. milk gets $7 per ton more than the man who is sending in 3.7 milk, and he took the 3.7 milk and ran it through the separator and brought it up to 5 per cent. Could he get $7 more by doing this?

MR. PUBLOW: He should not get it, for it would not be normal milk, and the yield of cheese would not be so great per pound of fat.

A MEMBER: Would the loss of fat in the whey be greater when cream was added to the milk?

MR. PUBLOW: Yes, slightly greater.

MR. SINGLETON: You said, taking all things into consideration, that straight fat was the better way, what do you mean by that?

MR. PUBLOW: I mean when you take into consideration the extra cost and labor in connection with the casein test and the difference there is in the quality of the cheese.

MR. AYER: I do not want any mistakes about this matter. This is a thing that ought to be clear-cut. Here is a cow giving sixty pounds of milk 3% fat, or 180 pounds of fat; and here is another giving 45 pounds of milk, 4% fat, which makes 180 pounds of fat. That man who is sending in his 45 pounds of milk is only getting three-quarters of the returns that the other man is getting under the system of having no test, and if he had a test the man who is sending the 60 pounds of milk would get no more money back than the man who is sending 45 pounds of milk. It is not always the quantity of milk that tells the story, and I repeat that the 45 pound cow testing 4 per cent. should bring just as good returns to the farmer as the 60 pound cow testing 3 per cent., and he should get just as much money.

MR. EVERTTS: I would like to say something to these gentlemen. Take a cheese factory conducted successfully where the Babcock test was used. I would like to see them hold their patrons, and I would like to know why it is that Prof. Dean and Prof. Robertson have not yet agreed on this matter. Prof. Dean said a pound of casein was worth as much in dollars and cents as butter fat, and I would like to know why a man from the platform yesterday advised the dairymen of this section and the farmers of this section to go into this high-class cow that would milk up to eight thousand pounds. When you get that class of cow you do not get quite as much butter fat. That is the class they are advising the people to get, and they say that is the cow that is going to make cheese. I put in a Babcock test; all the patrons voted it in but they kicked it out. I ran it for three years, and in that three years I had eight different men to make the test for the patrons in that factory, and yet they were dissatisfied. And whom do you think the gentleman was who made the test for the last season? Mr. G. G. Publow. And although they found no fault with Mr. Publow they kicked the test out, and I found that during the time we were paying by test that the men that lived near the towns and cities did not have much cream on their morning's milk. They said they found no fault

with the Babcock test, as they could sell their cream for more money in the town than bring it to the factory.

I want to know if there is a cheese factory man who wants to start a lawsuit with his patrons. If my people say they want a Babcock test in the factory they can put it in, but it won't go in by my choice. Take an individual test, and what difference do you find? It is not enough to talk about.

The people are looking for Holsteins all the time. Forty-eight head recently sold for an average of $236 apiece, and 11 of them were calves. I have been 43 years in this business; I am the pioneer of the east in this business—and have some good factories, and I am turning out some good cheese, and I am going to run my factory as my patrons want me to. If they want it tested they can put in the test themselves, and also the man who makes the test. That is the only way they will ever put it in a factory of mine unless they put it at the muzzle of a Gatling gun.

MR. WILSON: There is no doubt that some years ago it was difficult to pay by the Babcock test. But Mr. Publow and other gentlemen have proved that the higher testing milk did make more cheese.

We have been able to pay by test in our factory, which has been running for seven years. We had a lively discussion every year, some men being opposed to the test; but we have had the test continually since we started, and at the annual meeting only three men voted for the pooling system.

A good deal has been said about the condition the milk is kept in and that it has a good deal to do with the yield. Would it not be practical to take into consideration the acidity and ripeness of the milk, and where a man was sending over-ripe milk or milk that was above a certain percentage of acidity he should be cut in weight—his 100 pounds of milk should be marked down to 95 pounds. A farmer knows perfectly well that milk that is not properly treated will not make as much cheese; but unless you touch his pocket he will not lose the time to take care of the milk. I find in our factory that people whose test has gone below the average are satisfied. I agree with Mr. Evertts in one point, where he says he does not want to cause friction with his patrons. I own a factory where the milk is pooled and I leave them alone, but I believe that the best way is to pay by test.

MR. EVERTTS: I would like to see Mr. Wilson undertake to dock one of his patrons.

A MEMBER: Does it improve the quality of the cheese according to the raise in the test?

MR PUTNAM: I would say, yes.

A MEMBER: Does it partly give quantity and partly give quality?

MR. PUBLOW: Partly give quantity and partly give quality, and that is a point we should consider. We talk about this thing starting years ago. With all due respect to Mr. Evertts for the splendid work he has done in the dairy business, I am satisfied that if Mr. Evertts' patrons said to him that they wanted to be paid by the test he would see that it was done. Who is it that rules this thing? Is it the man with the poor milk or the man with the rich milk who are the men who stand for the pooling system?

MR. WILSON: In our factory it was the three men who tested the lowest.

MR. PUBLOW: Just so long as factory men have not got the backbone to stand up and give the people their rights you will have the pooling system; and as long as the patrons who are sending good milk have not got the backbone to demand their rights, we will have these conditions. What is the good of dairy education if the patrons will not make advances? What is the main reason why

it is so difficult to get the dairyman to change his work? I venture to say that if the people knew, fifteen or twenty years ago, what they know regarding this matter to-day, there would be very few factories remaining on the pooling system. Other countries which are competing with us are not pooling their milk.

A MEMBER: Which patron is losing the greatest, the patron whose test is not quite as large, or the patron who is taking the better care of his milk?

MR. PUBLOW: I think the greatest loss to-day comes from receiving milk out of condition.

A MEMBER: Could you suggest a remedy for this?

MR. PUBLOW: I would suggest that the patrons pass a resolution at their annual factory meeting, "That all milk intended for cheese making must be cooled to below 70 degrees." I would also recommend that the cheesemakers demonstrate to the patrons the losses that occur when milk is delivered at a high temperature, and out of condition, drawing their attention to the difference in yield.

A MEMBER: Do you think the test is properly carried out in the factories where it is in operation?

MR. PUBLOW: That is a pretty hard question. I think that probably the weakest point is in caring for the samples. The test is no good unless the sample has been properly cared for. The Department of Agriculture is preparing for this by insisting on better men. They are asking cheesemakers to hold diplomas. We want men with better training in the business.

MR. AYER: It can be done if the cheesemaker understands his business.

A MEMBER: We were paying by the test at two of our factories. I went to one of them one day and found half a dozen of the samples thick, and I said to the cheesemaker, "How does the Inspector test that milk when it is thick?" He said, "He throws it out and averages it up." I believe there is a lot of that kind of thing done.

A MEMBER: I think that sometimes it is all thrown out.

A MEMBER: I believe in the paying by test if it is run properly; but if the majority of the patrons of a certain factory have their milk averaged up by a lot of samples that have got thick and that have to be thrown out, being tested, then I say the day is not come when we can pay by the test. The factory patrons were very much in favor of the test, and we left it in their hands, and what do you suppose happened? The very man that moved to pay by the test, and wanted it so much, when we paid him off the first month was the lowest man in the factory, and he went to another factory and never came back. If there was a law prohibiting patrons changing from one factory to another in the season it would be a big step towards accomplishing what we are after. Take for instance two factories side by side. One runs on the pooling system, and the other on the testing system. I have not the least doubt but that the testing system improves the quality of the milk, and I believe it is the better way to run a factory; but so long as conditions exist as they are to-day it is a dangerous thing for a manufacturer to force discontent in his factory.

We called a special meeting at one of our factories and what do you suppose they did? They kicked the test right out. Our hands were tied, and if we insisted on the test we would have lost half of our patrons. There ought to be some plan devised whereby patrons would stay by the factory they start with.

MR EVERTTS: I know a factory where a man produced 280 pounds more one morning than he did another from the same quantity of milk, and there is where the trouble is in the caring for the milk. When the Government passes an Act that all the milk of this Province shall be paid by test, then you will have it right,

and the man that is pooling milk cannot get my patrons from me. I hear considerable discussion about cows. You can take any man with a herd of five or seven or eight cows running from five to eight years of age, and put him alongside of a man who is helping to build up this industry and carrying a herd of 25 nice cows, and is bringing in some youngsters every spring to keep the herd up. The result is that the second man will probably not test quite so high as the man who has got only four or five cows, because the young ones will not test as high, and the man who is building up your factory will pool his milk when he finds the fellow with only four or five cows gets more money on the test.

MR. BARR: The first consideration in connection with our cheese industry is pure milk. We must have sanitary milk to make the finest cheese. I think the second problem is how to divide the profits. Mr. Publow said we made a mistake in connection with this work. I think we are making a mistake right to-day, and until we get our dairy authorities in Canada agreeing on some method of paying for milk in the cheese factory, we might just as well sit down and let the thing go the way it is. (Applause). I think that is the foundation of the whole thing. I have been attending annual meetings for the last seven or eight years, and the minute you start talking of payment for milk you have three factions in the meeting and have got to deal with these three factions. One man will say, "I do not want the tests." Another man says, "I like the test but I want it straight fat," and another will say, "I want to add 2 per cent. How are you going to get these men together when there are three methods of paying for milk? The farmers cannot be blamed for the stand they are taking to-day, when you find a man like Mr. Everts right against it, and another man in favor of it. I say that the experts in this country, the men who are supposed to give the best advice, should get together and decide among themselves as to what is the right thing, and then have a campaign of education in connection with this work. (Applause.)

MR. PUTNAM: It would appear from the discussion that has taken place that the introduction of the test system will not come from the makers or the factory owners. They are not going to introduce a system which will antagonize the people, and Mr. Barr has touched upon a very important feature of the work. It appears to me that if it is ever introduced it must be asked for by the farmers. It must be demanded by the farmers who are producing good milk, and the trouble that Mr. Barr has referred to that we cannot go out now and advocate any particular system makes it difficult to talk the subject. I would like Mr. Singleton to give us a brief statement as to what was said regarding the methods of testing at the meeting in Guelph, and I would like Mr. Publow to say a word about the whey butter question.

MR. SINGLETON: Professor Dean and Mr. Hearns both spoke on this question. I do not want to quote them, because I might possibly give it wrong, and I hope Mr. Putnam will excuse me. Prof. Dean's position was that we should use both the fat test and casein test, but has not got any way of working that out that is practical. He says we should test twice a month for fat and for the casein test. He says we cannot keep these samples longer than one week, and get satisfactory results, and he advocated to test the first week and the third week for the casein test. The question naturally arises, who will do the testing? His suggestion was to have a central station and send the samples there. But who is going to pay for it? It will be either the factory man or the Government. I do not believe the Government should pay for it. We are just where we were twenty years ago. If you introduce this question in a cheese factory you will have trouble at once. I was at a factory meeting the other day where the proceeds were being divided on

a straight fat basis. More than half the patrons voted to continue, and the rest of the patrons are going to ship their cream to Toronto. I heartily agree with Mr. Publow, and my opinion is that the straight fat basis is the proper way to pay. I know the case referred to by Mr. Leggatt in which the two extremes were 3.5 and 5 per cent. I did the testing myself, and the difference between the high and the low man's proceeds was about $7.50 per ton. Of course this is an extreme case, and is a very wide difference. In that same factory for that season the pounds of cheese per pound of fat for the month of May was 2.65. This cheese would naturally be made a little softer than the early shipment, thereby getting a little increased yield per pound of fat. For July, August, September, October and November the yield of cheese per pound of fat was 2.63 in every case, and during this time the average fat contents of the milk per month dropped from 3.4 to 3.25, and raised 4.2, so that in this case the yield was in exact proportion to the fat contained in the milk.

Mr. Cowan: Supposing the patrons ask which is the best way to pay, would a manufacturer be justified in replying that he considered the fat basis or plus 2, is better than the pooling system?

Mr. Publow: Yes.

Dr. Publow: I have made some study of the methods employed in the States in connection with paying for milk, and in some of the Western States especially, it seems to me, this thing is being worked out nicely when the fat basis is employed for paying for the milk for cheese making. A law has been passed compelling all the factories to pay for the milk on the butter fat basis whether the milk is made into cheese or butter or sold as milk. For the benefit of those patrons who feel that they are not receiving just treatment a law has been passed which states that when the samples of milk are kept in a composite manner by the manager of the factory, duplicate samples must be kept. After the test has been made a list is posted showing every patron of the factory exactly the grade that is given for his milk. One set of samples must be kept for three days after the test is made, and if the patron is not satisfied he has the privilege of having his sample sealed in the presence of witnesses and sent to the Agricultural or Dairy School to be retested. That system is worked out in this way, and if the maker uses dishonest methods or careless methods it is shown up against him when the test comes back from the place where it has been sent to be retested.

During this year, when the makers had to be licensed under the control of the Provincial Government, if a maker does not do properly it is within the power of the Government to discharge him, and he ceases to be so, so far as the dairy industry is concerned.

So far as paying for milk on the straight fat basis is concerned I am in favor of it. In my address this afternoon I intended to show some figures on the question. But so far as paying for the casein is concerned, I do not think it is practicable to be put in a cheese factory. I have used it, and the chemists have used it, and in the duplicate samples of milk we have never been able to get a test that is the same.

Dr. Van Slyke, of Geneva, has got out a test, and I have used it, but have found very unreliable results, and I think we have to go back to paying on the fat basis. If I wish to criticize the Dairymen's Association for any one thing it would be for lack of co-operation in things like this. I think we ought to appoint commissions or committees, and every year when we meet here each committee ought to be able to report to this convention some one thing. We ought to have a committee of three or five in connection with paying for milk, and during the year that

committee ought to make special study of that question. Thus when the Association meets next year, that committee ought to be able to give us in condensed form the latest and most up-to-date methods of paying for milk.

With regard to paying for milk in regard to condition, that is being solved in a good many places by the factories refusing to accept milk that comes in at a temperature over 60 degrees or with an acidity of .21.

So far as forcing the farmers to send their milk to any one factory, that is class legislation, and no Government would stay in power very long if they did that. The farmer is at liberty to sell what he likes, where he likes, and there should be no law to compel him to change.

WHEY BUTTER.

A MEMBER: I would like to know whether whey butter is sold as whey butter or creamery butter, and what effect it has on creamery butter?

MR. G. G. PUBLOW: It seems to me that I am bound to get up against hard things to-day. I thought likely that question would be asked, and I think the creamery men are justified in asking it. If you will permit me to give you. not my experience, but the opinion of quite a large wholesale dealer in creamery. dairy. and whey butter, I will read to you a letter I just received from him regarding this very point about which you have asked.

KINGSTON, ONT., December 30, 1910.

MR. G. G. PUBLOW, Eastern Dairy School, City.

DEAR SIR,—As large handlers of creamery and dairy butter in this district, we desire to place before you our ideas in reference to the effect of whey butter on the general market, also with reference to the effect on creamery butter in particular.

For the last three years we have handled considerable whey butter made in this locality. The quality in some instances has been fair, but the great majority has been poor. In fact, we have handled a good deal of it, made in the factories, that cannot be called butter. At present we have in our warehouse three or four packages of this butter that was made in August, which we would be willing to sell to-day at five cents per pound. The keeping quality of these goods when not properly made is very bad. We think something should be done at once to place the butter on the market on its own merits. If the matter is not attended to by the proper authorities, the result will be serious to our creamery butter trade. A great many people are selling it for creamery. It is gathered in the country, shipped to the cities and sold there, as a rule, for creamery butter. It is easy to imagine the effect of it on our creamery. The surest way to obviate this difficulty is to compel all cheese factories who manufacture this article to brand their goods as whey butter. In this way the creamery men would be protected, and the consuming public would also have the necessary protection. Should any of this butter find its way to the English markets, as solid creamery, the effect produced there would be serious. As a rule our butter on the English market has been good for the past three or four years. No doubt the demand for our Canadian butter will improve on the foreign markets, if the quality is right. We trust the Government will take this matter in hand, and pass such a strict law that no one will care to handle these goods, except on their merits.

Trusting you can use your influence in this way, we are,

Yours truly,

J. Y. PARKHILL & Co.

SENATOR DERBYSHIRE: What is the reason he does not buy creamery butter? Does he want to buy this whey butter at two or three cents less and pawn it off as creamery butter?

MR. PUBLOW: No; the butter is being offered to him as creamery butter.

A MEMBER: Would that whey butter that he is to sell at 5c. a pound be in good condition when he purchased it?

MR. PUBLOW: I do not think it would be, but it would be quite possible for it to deteriorate in the warehouse.

SENATOR DERBYSHIRE: A good package of creamery butter kept from August until now in an ordinary place, would it be good butter?

MR. PUBLOW: Not now. It is possible to make reasonably good whey butter, but our experience is that it is not good keeping butter. It is worth more the day it is made than at any other time, and I think it is only fair to the creamery man that it should be branded as whey butter. There is no kick against making it, but it should be sold for what it is worth, and for what it really is. Let the people know what they are getting. The unfortunate part of this work is that many men who are making whey butter have had no previous experience in making butter. There is also an attempt being made to make cheese and butter with the same help, and both the lines are neglected. I might say that at least two-thirds of the men who are making whey butter this year had their cheese or butter under finest, and I think that if the making of whey butter is to be continued the creamery business must be protected. I think the creamery men are justified in asking that whey butter be branded as whey butter.

MR. BARR: According to the law as it is at the present time, there is nothing to prevent a man from branding whey butter made in the cheese factory as creamery butter. If the dairymen request that the law be changed I suggest that you should recommend to the Department at Ottawa that such change be made. The demand should come from you.

SENATOR DERBYSHIRE: The patrons who sent their milk to these factories consume the butter made at that factory, or practically all of it.

MR. PUBLOW: In some of them they do.

SENATOR DERBYSHIRE: We used to sell thousands of packages of butter to the factory patrons, but we do not sell any now, because they manufacture it at home, and of course that is against the creamery men who used to have this market.

MR. AYER: We have found out from actual experience that the finer the butter the larger the consumption of it. If you give the people a very choice butter they will eat a great deal of it. They will eat butter anyway, even if they have to eat the poorest kind of dairy butter. I have never been fortunate enough to see any whey butter that I could sell for any other purpose than only to second-class cooking people. I could only sell it at the very lowest price. My objection to whey butter is that no first-class factory can afford to make it. If they are making their cheese properly they are not putting in fat enough to make it out of. (Applause). Every pound of that butter that is consumed by the farmer simply takes from the milk two or three pounds of this butter that would be consumed by some other parties, whoever they are. (Applause).

A MEMBER: I would like to ask Mr. Publow if the butter fat can be taken out of the whey so that there will not be any left to make whey butter from?

MR. PUBLOW: No, it cannot all be taken out. There is bound to be an unavoidable loss, but when the milk is in proper condition and successfully handled the loss will be so small that it will not pay to put in expensive machinery to recover it.

MR. WILSON: I am surprised to hear the Instructors coming forward and condemning whey butter. A year ago the Instructors came around to the factories advocating the making of whey butter, and telling us what profitable business it would be for every factory to put in a plant and manufacture it, and that

they would guarantee to the patrons from 18 to 22c. a pound for their butter. A good many factories took this advice and put in expensive plants, and to-day we find the Instructors coming around and condemning the whole business. Is it any wonder that the farmers have to sell their milk for 85c. a hundred? Such things as these are the cause of it.

We have heard to-day about the quality of whey butter. Mr. Publow himself gave the prize at the Brockville Exhibition three years ago for whey butter against every single pound that was there. I say the whole thing is ridiculous, and I say that in place of these Instructors coming around and educating the farmers they are confounding them. It is time we were standing up for our interests. It is time there was something done, and not have the farmer crying out that this great cheese industry is falling down.

I was in a certain house one day, and the lady asked me what I thought about her butter. I told her I thought it was pretty good. She knew I had always been prejudiced against whey butter, and she said it was whey butter, and I had to acknowledge that it was good butter.

The question was asked in our factory, "Did it injure the whey for feeding pigs?" Last summer I never got a bit of satisfaction. The whey seems to have as good feeding quality as it always had. It washed shorts or something else down the pigs' throats; it did that before and it will do it still. The only difference is that it is cleaner and sweeter; the pigs do not need to come up and take a snap at it and jump back to the end of the pen. As far as my experience goes, the whey is all right and the butter is all right. Our plant cost between $600 and $700. We sold $1,100 worth of butter in the season, and there was a ready demand for it, both from the patrons and from abroad. I think if this kind of thing is to go on, and the Instructors are to go around and teach us one thing one day and another another day, it is time we went back to the old way and have every farmer hoe his own row.

A MEMBER: Who were these Instructors?

MR. WILSON: Mr. Echlin.

MR. BLAKIE: From three years' experience in this whey butter business I do not propose to say it is a success, especially in a small factory where the cheese-makers cannot afford to hire extra help, because he will knock the cheese business every time. There is a company now collecting cream and drawing it to Picton, and they have a ready sale for it. Last year we sold no whey butter for less than 23c. a pound wholesale, and the dealers in the town of Picton sold it for the same price as creamery butter. I believe a good quality of butter can be made from the whey. In my factory there was $2,300 worth of cream sent to the Central Factory to be churned.

MR. ECHLIN: With regard to the whey butter question as spoken of by our good friend Mr. Wilson, it is very true that Mr. Wilson and his neighbors asked me to come over and address a meeting when they had some idea of putting in a whey butter plant, and they asked some questions with regard to the cost. I want to say that they asked me something that I could not answer, and that was, "Which kind of separator is the best to put in?" They are pretty well decided as to the advisability of putting in a butter plant for the manufacture of whey butter. Three years ago we manufactured whey butter in one factory, and two years ago we manufactured whey butter in three factories, and in 1910 we manufactured whey butter in five factories in the County of Lanark out of forty-seven factories. Then we hear Mr. Wilson say that I advocated the manufacturing of whey butter.

I never advocated the manufacture of whey butter. If I did, we would be manufacturing it in more than five factories out of 47.

MR. WILSON: I have had conversations with you many a day when you advocated whey butter.

MR. ECHLIN: I want to say to you that the whey butter that is manufactured in Lanark County is only in five factories, and practically all of that butter is being consumed on the farm. I want to say on behalf of the dairy business that if any factory sees fit to put in a butter plant and manufacture a few pounds of whey butter, they must shoulder the responsibility; and if they are eating it on their own tables, and it is only made in June and July when there is a surplus, then the farmers should have the whey butter. We had to close one factory at Balderson early in the fall and manufacture butter from the whole milk.

A MEMBER: What is your opinion of whey butter?

MR. ECHLIN: If it is properly made and we use it up in a reasonable time after being manufactured, I have no fault to find with it. When it is well made it is better than the average dairy butter that we can buy in Perth.

MR. G. G. PUBLOW: In answer to Mr. Wilson's assertion that I gave the prize to whey butter, I have to say he is right, and I have done that on more than one occasion because it deserved the first prize. It was in competition with a lot of creamery butter, and that creamery butter could not be classed as the finest. The whey butter was a better quality, and I had the courage of my conviction and gave the whey butter the prize.

SENATOR DERBYSHIRE: And it was done right. I was there.

MR. WILSON: What has been done before will be done again.

MR. EVERTTS: I am well satisfied that Mr. Publow used good judgment in giving this prize. There are different ways of making whey butter, and I would not want the cheese that was made in the factory where that whey butter was made. It did not contain any more butter fat than was necessary. Mr. Publow summed up the whole thing when he said he had failed to see this year where the two were being run that one or the other did not suffer from the fact of their making whey butter. Canadians pride themselves on being straightforward men, and we all know that if a man goes to the grocery and pays 30c. for a pound of whey butter when he should get a pound of creamery butter, he is not being treated fairly. More than that, there is not a good factory in this Province to-day that can afford to make whey butter. (Applause.) The whey is worth more delivered to the farmer in fine condition and the farmers are coming to use it, and I would move a resolution that whey butter should be branded as whey butter.

THE CHAIRMAN: It is moved by Mr. Everts and seconded by Mr. Wilson that in the opinion of the members of this Convention whey butter should be branded as whey butter.

MR. WILSON: Before passing that resolution I would like to make one remark. Mr. Publow gave the prize to this whey butter and it deserved it, but did not the cheese from the same factory take the prize at the same show?

A MEMBER: As long as the milk is received at the average factory in the condition it is at present, I would object to branding it as whey butter.

MR. AYER: It is not a question of whether it is a profit to make these goods, but it is a question of being honest. You are going to hurt the whole business. Let us be honest and straightforward.

The motion was put and carried, only two voting against it.

THE FARMER, THE MIDDLEMAN, AND THE CONSUMER.

A. A. Ayer, Montreal, Que.

I am glad to be in the good old town of Perth. Some allusion was made yesterday to Perth having had the honor of sending to Chicago the biggest cheese in the world, which afterwards went to London, England. I saw it when I was in England, and I have a photograph taken of it when it was in England, and it is in my office to-day.

I beg to thank the Dairymen's Association of Eastern Ontario for their kind invitation to address this, the most, or, at least, one of the most, important meetings of dairymen in Canada.

For twenty or thirty years I have been addressing dairymen's meetings, and I have been wondering what I might say to-day out of the beaten path.

Time flies! Indeed, we are living in the days when men fly.

Do we yet realize that we measure time by a different standard to-day from that which our forefathers used—that a day—a year—a lifetime means vastly more than in the olden time? Why is it so?

Marvellous changes, discoveries and progress have taken place in the last hundred years—greater far than in the previous thousand years. What did people know about China, Japan, India and Africa, and how almost impossible it was to reach these countries a hundred years ago?

One century ago the world knew nothing about the use of steam or steamships, railroads and telegraphs, nor even about kerosene oil. Fifty years ago nothing was known of electricity in its various practical uses, nor of telephones or wireless messages, not to speak of flying machines and innumerable inventions.

Wonderful advances have been made in education, especially in the sciences, medicine, surgery, sanitation and in all technical matters.

A revolution has taken place in manufacturing, transportation, construction, commerce, administration, and in heat, light and power.

It seems to me that our fathers were born on the "edge" of the years when men first began to hurry.

I repeat, I have been wondering what I might say out of the beaten path.

I am here representing also the Montreal Produce Merchants' Association. In this dual capacity may I not say some things concerning the producer as well as the man who handles butter and cheese—concerning the man who toils on the farm and in the factory, as well as concerning the man who is in the toils between the producer and the consumer and who is squeezed by both.

The points I would like to make in my address are:

1. Larger production more important than increased prices to the farmer, because the farmer can increase his production, but he cannot increase or govern prices.

2. The usefulness of the "middleman" and unfair criticism of his position.

3. We should aim at the ideal, viz., fairness to the farmer, fairness to the middleman and fairness to the consumer.

The Government of Ontario, through the Dairymen's Association, has for many years been improving the quality of cheese throughout this Province until your cheese are in quality second to none made anywhere in the world. You are also demanding a certain class of factory building, suitable for the making of cheese under sanitary conditions. Having trained the makers to make a first-rate quality, it was necessary that the factories be improved in order that the makers

might be able to handle the milk in a satisfactory manner. Now, I understand, you propose to see that the farmer keeps his cows in proper stables, feeds them properly, and delivers the milk in a sanitary condition. Judging from what I have seen in the newspapers and heard, this last proposition is, and will be, the most difficult of all.

I hope that the Government of the Province of Quebec will follow your example.

The large and best factories do not need the aid of the Government or the Dairymen's Association—they can take care of themselves. But the small, poor and indifferent factories do require inspection and help until they come up to the standard of finest cheese.

The farmers of these two great provinces—Ontario and Quebec—have had a good year, or at least they ought to have had a good year, as the pastures were excellent and conditions favorable, and the prices were good, indeed far better than they were a few years ago.

Considerably less cheese was made in the Province of Quebec during 1910, but fully 20 per cent. more in that part of Ontario east of Toronto, which this Dairymen's Association represents and which has now become the great cheese producing section of Canada.

While Canada is exporting at least 500,000 boxes less cheese than she did seven years ago, we must not forget that New Zealand is shipping to England 500,000 boxes more, while other countries are also shipping more.

It is a mistaken idea to suppose that Great Britain is consuming less cheese; rather she is consuming more than ever. In order to retain the premier position held in the markets of Great Britain for so many years, any other manufacturing industry would seek to reduce the cost by increasing the production. If a factory now producing 1,000 cheese and selling at say $9.00 per box, giving $9,000, could make 1,500 boxes from the increased milk of the same farmers and sell at $8.00 per box, it would give $12,000, or for each farmer one-third more than obtained formerly.

Note that price is not everything—quantity tells.

Lest I forget it later on, permit me to say that a good many factories are using boxes that fit so tight that the cheese will not turn out.

I hope the factorymen, in ordering or making their boxes, will correct this.

The estimated production of cheese in Ontario and Quebec for the season 1910 was 2,175,000 boxes, of a value of $9 per box, or $19,575,000, and the estimate of butter about 2,000,000 boxes of fifty-six pounds each of a value of $12.50 per box, or $25,000,000.

The receipts of cheese into Montreal were over two million boxes, and of butter 425,000 boxes. The official Board of Trade figures of the receipts of cheese into Montreal (to the 1st December) were 1,963,064 boxes, and the correct shipments were 1,892,235 boxes, but as this would leave only about 100,000 boxes in stock, the receipts are manifestly incorrect, and I fear that until some pressure is brought by the Government upon the railroads and steamboats centreing in Montreal to make exact daily returns, we shall continue to receive incorrect figures.

The above figures do not include the large amount of milk now being consumed by our cities, nor the amount of cream shipped to the United States, where it is said to have been made into 100,000 boxes of butter.

In connection with this cream exported to the United States, do note that large dealers in butter in the United States expressed the opinion last spring that the small quantity of butter coming from Canadian cream would not affect their

market in the slightest, while to-day New York and Boston find their markets dull and lower, with 100,000 boxes of butter more than they require. Canadians had better not build too much on the United States outlet for cream or butter, as if our shipments doubled up it might bring down their market to our level of prices.

It is interesting also to note that the price of cold storage select eggs in Chicago is to-day 22c., while they are scarce in Montreal at 28c. to 30c.

The quantity of cheese and butter is disappointing, and yet when the Dairy Commissioner and his staff anywhere endeavor to make suggestions regarding the bettering of dairy herds, so that more money can be made in farming, there is a general shrugging of the shoulders and a turning aside of the head, as much as to say, "What do you know about farming, anyway?"

You may count me among the number who sometimes dares to suggest that the farmer might help himself and thereby improve his position very much. Permit me to say that if we lack in knowledge of farming we know something about business and modern business methods. Farming is business, or at least it should be a business, and should be conducted in a business way.

A short time ago I wrote to the *Farm and Dairy* and tried therein to set forth how the farmer could increase his profits by keeping better cows. I am trying in a small way to raise the standard on my own farm—not by paying fancy prices for thoroughbreds, but by gradually increasing the milking qualities of the herd.

My letter brought a reply, and still another reply.

That gentleman and I agree upon one thing, that is, that the quantity of cheese being made is not increasing; but we differ as to the reason therefor. In effect, he says that farming does not pay, and indicates that the price paid for produce is the reason, and that the dealers are to blame for not paying better prices. How did our fathers live and prosper on much lower prices?

I attempted to show that the farmer should follow the ways of the manufacturer and the merchant and increase his production without materially increasing his gross cost, and that thereby he would increase his profits.

In endeavoring to make my point I illustrated the difference between the average dairy in Ontario and those in Great Britain or Denmark, and by so doing showed where the farmer's income could be increased 50 per cent. or more. Cannot the Canadian farmer do anything that the English or Danish farmer can? Here and there a Canadian farmer is doing it. Cannot all do it? We ought to be making three million boxes of cheese in Canada to-day, and we can do it in the same factories if we keep better cows. But we must start right and on a fair basis for profits.

My friend takes as his basis a farm of 100 acres that will keep 20 good cows, and put the value of such a farm at $10,000. My reply is, to offer a farm that will keep nearly double this number for $10,000. Or, to put it another way, I might, in comparison, have said: A 100-acre farm that will keep only 20 cows is not worth more than about $5,000, or, say, $6,000, including good cows.

My friend replies, claiming that the price should include the cows, and 8,000-pound cows at that, instead of good cows, although neither he nor I said anything about the cows on our farms being 8,000-pound cows; but even cows that milk 8,000 pounds per annum, if included, would not add more than another thousand dollars to his farm.

What difference does it make concerning the value of the farm itself, whether the cows are giving 3,000 or 8,000 pounds? The point that I intended to make was that the value of a dairy farm is reckoned mostly by how many cows and other

necessary stock it will keep. If the farmer chooses to keep poor cows that go dry in six months, no wonder he finds farming a poor, dry business.

Poor farming is like a manufacturer trying to run his business with old, out-of-date machinery; he has only to keep at it long enough to fail. If you read these articles in *Farm and Dairy,* and my replies carefully, you will see that our friend does not quote what I write correctly.

I ask the same old question again: I ask the farmers in this audience, "Can you not increase your income by keeping better cows?" If so, why don't you keep them? You must be reasonable and businesslike if you expect to make money out of your farm. Of course, farming is hard work, but don't you imagine that success can be gained in any business without hard work—neither eight hours a day of work nor a life of ease or pleasure will bring success; there is not any kind of work on the farm which I have not done and worked at it from daylight to dark, summer and winter. It is not the kind of work one does, but the spirit and interest in which it is done that tells. The man who is bound to make a success, and works at it, will succeed. The man who is a grumbler or a "grouch" will never succeed at anything. Your grandfathers cut down the forests to make these grand farms. It took them 20 to 30 years to do it. You cannot double the productive value of your farms in one year, but you can most farms in ten years or less.

While the Western farmer is wheat mad, and is "skimming his farm" (to quote Mr. Whyte, Vice-President of the C.P.R.), and will thereby leave it almost worthless, you should be patient, and in a few years the farmers will be coming East, as they are in the United States.

My friend asks why I left the farm, and while the question is put to me as a bit of sarcasm, I will try and answer it honestly.

I left the farm as a boy, and it is rather difficult to point out why a boy did things more than forty years ago. I might have gone into McGill University—or a dozen other things—but dropped into the produce trade, probably because I came from the farm and country, and unfortunately knew something about butter and cheese. I thought I could learn the business quickly, and that I knew more than the men who were in the business. When I had worked two years I found out a few things, and the principal one was that I did not know as much as I thought I did, and I have kept on learning that same thing ever since, and know more about that fact to-day than I ever knew before.

Great changes have come into dairying in Canada during these fifty years, and yet, while there has been great improvement in the quality, the larger number of the single farms have not increased in the quantity of milk per cow. I remember that on the old home farm, considerably more than forty years ago, father made 160 pounds of butter per cow in a twenty-five-cow dairy; that would make an average of about 4,000 pounds of milk per cow per annum. Until within the last few years that farm, and all the farmers in the neighborhood, had allowed the breed of cows to run down, and only in the last few years has a change come for the better.

Most of the farmers in that country are farming in the same old style, indifferent as to the quality of the cows they keep and running their farms with the same old rule of thumb. Some of the farmers have plans of their farms, dividing them into fiields and each field divided so as to plow so many acres each year; they get to know the kind of treatment required in each field or in each variety of soil. When all our farmers study their meadows and pastures, lay out the work in each field—not days or months, but years ahead; when they study their cows, the health of the cow, the feed, the water, the suitability of the stables, the regu-

larity of feed and milking; when they weigh their milk every day and test it often, then they will begin to find farming a real pleasure, and with the pleasure will come the improved profits.

This intelligent audience here to-day knows well enough that what I say is true; you know it, and you know how to carry it out better than I do. Why is it, gentlemen, that so many farmers keep on in the same old-fashioned way?

All the nations of the earth are talking about Canada, the modern land of milk and sweet things. It will not do to let them know of such things as off-flavored or mixed curd cheese or of dirty and unsanitary milk, and, of course, our clean white pigs could never be made into poor sausages.

Let me add that each section of the country should do what is best; some sell milk, some make cheese, some butter, and some work at mixed farming.

I have given you what I conceive to be a picture of the farmers' side of dairying.

What about the merchants' side, or the man who handles the goods?

Take the article of cheese, in which you are more particularly interested. The price has kept fairly steady in Ontario for the past two or three years. Cheese has been retailed during all this period in England at 6d. to 7d. per pound, or 12c. to 14c. There is positively no room for profit between the price that is paid the farmer and the price at which these goods are retailed. No argument is necessary to prove that. Adding railway freight, the necessary charges of handling in Montreal, and the steamship freight, and the actual cost of cutting up and retailing cheese, and you can easily see that there is no margin in the article.

I do not suppose that any of you are complaining of the low price at which the poor laboring man in England can buy his bit of cheese, but you are inclined to complain of the big profit that we middlemen make out of you farmers, and, I think, complaining without reason.

I make the assertion, and I am ready to prove it by most incontrovertible facts, by the best acccountants and auditors in Montreal. that without any profit to the owners of the business or interest on their capital, there is not left to these dealers in Montreal one-eighth of a cent per pound (or one per cent.) profit on the cheese they have handled for several years past.

Perhaps this statement astonishes you, and you can hardly believe it, but it is true, and I do not know of any business of any kind that attempts to live at so meagre a profit. There is no occasion for the farming community in Canada to grumble at the profits made by the middleman. There is not sufficient left to pay the interest on the capital invested in the business and give the owners of the business a fair remuneration for the time and labor employed.

In proof of this, note all the failures and the very, very few successful men in the business—more than ninety per cent. of all that have engaged in the business in Montreal have failed; there have been between forty and fifty failures in the last forty years! People are fond of informing us how cheese has advanced in price at certain times, but they do not notice the decline in price, and I presume I am safe in saying that there are still a few things about the busness that those outside the trade do not yet undersand. Many have come into the business to learn this to their sorrow, as some of the farmers throughout the country know to their cost. Those in the trade who have money have made it in other ways.

What should be the position of the man who handles the goods, the man who stands between the farmer and the consumer? He should pay a fair price and demand a fair price in return. But some way the competition in our trade brings unfair methods. Perhaps I should not use the word "unfair"; a better word would

be "forced." I mean by this, that the ninety per cent. who have failed have bought more than they had customers for, or more than they had capital to handle, or, in other words, they have "over-bought," and hence they are forced to cut the price to sell, as they must have the money. This cutting of the price lowers the whole market and makes the trade unprofitable. The salesman's anxiety to find a new buyer and to get 1-16 of a cent more reacts on all the factories.

Overbuying is the curse of the trade. There is no need for any house—small or large—to cut prices if they do not buy more than they can hold over, for at least one week if necessary, without selling a single box.

Then the natural law of supply and demand will rule the market, and fair treatment will be given to all.

CLEANLINESS IN MILKING.

W. T. Connell, M.D., Kingston.

Milk is a perishable article of food, more so even than meat; hence the necessity for care in its handling. For many years now the doctrines of cleanliness in milking and caring for milk, and of cooling, have been preached, and the reasons, both practical and scientific, pointed out. Mr. Publow in his address has shown that it takes one-half to three-quarters of a pound less of clean, well-cooled milk to make a pound of cheese than it does of indifferent milk; and further, that the pound of cheese from the clean, cooled milk possesses a better flavor and shows superior keeping qualities, and hence is a more marketable article. In other words, cleanliness in milking and caring for milk, together with proper cooling, increases the value of each patron's output from 5 to 8 per cent., surely an excellent return for the effort it costs. Such facts as these—practical, reliable and incontestable—are put before the producers of milk, but yet some 60 per cent. at least of producers send their milk to factories not in the best condition. Further, so far the cheesemakers have been mixing the good with the indifferent or poor milk to make his average article, and the result is that the man who properly cares for his milk has been paying part of his earnings to the producers of milk of the indifferent or poorly cared for brand. That is, the careless milk producer has had a premium placed on his carelessness. How long are the careful dairymen going to stand this? Is it not time that they banded together and insisted, as did the patrons in the factory Mr. Publow has told us about, that their milk should be made up separately, and that they should get their full earnings. This is, as I see it, the practical or economical point of view. Now let us consider shortly the scientific reasons for asking for proper care of milk.

In the manufacture of our Canadian cheese the maker guides the milk and curd through a series of fermentations which change the perishable milk into a fairly stable food product (requiring, of course, as do all foods, due care and protection). In the manufacture of the best articles, good raw material is essential. Hence, for good cheese, good milk is required. Provided such is furnished, a capable maker can set up the necessary fermentations, and so guide them as to ensure a first-class product. Provided with milk in which probably half a dozen fermentations have already set in, many of undesirable character, the maker's problem becomes greater, for he has not only to set up the necessary fermentations, but suppress the undesirable ones. At least 75 per cent. of the taints or defects of cheese can be at once assigned to fermentations already under way in milk when brought to factory, but often undetectable by the crude tests applicable

on the weigh stand. The other 25 per cent. must be ascribed to the maker and the factory, and are being eliminated by the system of inspection in vogue, by the adoption of more scientific methods of handling the product, by greater attention to sanitation, and by the weeding out of poor makers. Less rapid and satisfactory progress is being made in eradicating the taints and defects due to the producer of the milk, and as I have previously pointed out, when the milk is mixed in the "make vats," a few poor batches will soon taint the whole mass. Like infectious diseases in men or animals, these undesirable fermentations, leading to taints or defects are due to bacteria, or, as some prefer to call them, germs or microbes. It is usually easier to prevent infectious disease than it is to cure disease itself, and a similar policy of prevention is essential in dealing with these taint-producing bacteria in milk. The maker finds it much easier to work with good milk than with milk seeded with taint-producing bacteria, for such milk, in so far as the cheesemaker is concerned, is "diseased," and must be "cured" to make a passable article. Now the cheese and butter maker finds that certain kinds of bacteria are required in the manufacture of cheese or butter, but if these are not present they can readily be introduced in his starter or pure culture. We need not worry about these desirable bacteria then; our worry is entirely about the taint-producing forms.

No matter how cleanly we milk, we cannot keep bacteria entirely out of the milk; but the cleaner we are, the fewer we undoubtedly will have. With great care we can get milk averaging in the mixed milk of a herd under 200 per cc. For this strict attention must be paid to every detail, such as grooming of cattle, cleaning of udders, cleanliness of milkers' hands and garments, small-mouthed milk pails thoroughly scalded out, and clean, non-dusty milking stables. The average of a certain dairy supplying certified milk in Toronto is under 1,000 per cc. when delivered to customers, and often runs as low as 200 even in midsummer.

The more careless the conditions of milking, the larger the number of bacteria there will be present at the end of milking, the mixed milk from the herd averaging then from 15,000 to 60,000 per cc. In other words, take the same herd, and alter the conditions of milking, and you change the bacterial contents of the milk very materially. These added bacteria must then come from sources outside the udder, such as from the dirt and hair of the cow, dust of milking place, from milkers' hands or garments, or from milk pails and cans. Any one or all of these may prove to be sources of seeding. Any dust or dirt containing manure particles or particles of decomposing food, carries with it large numbers of bacteria of the taint-producing type, tending indeed to lead to changes in the milk, such as they have already set up in the manure or decaying food. Thus, while it is not possible to obtain milk free from bacteria, we can by attention to cleanliness in all respects markedly reduce the numbers seeding the milk. Seeding can occur at periods after milking if the milk is not properly protected. Hence, milk should be kept in a place free from dust, protected from flies and other insects, and from animals. By such attention to cleanliness in milking and after care, the possibility of the milk being seeded with taint-producing forms of bacteria is greatly lessened. For it has been time and again proven that these bacteria come mainly from "dirt" in some form—as manure-laden dust, dust from decaying food, from remnants of whey or milk left in seams or crevices of cans or pails to ferment, and such like sources.

Now, bacteria require for growth food, moisture, and moderate warmth. Food and water are present in abundance in milk. The milk as it leaves the animal's body is at the most favorable or suitable temperature for bacterial growth, but most types of milk bacteria continue to grow moderately well down to 70°.

Below this growth slackens off till at 55° there is almost no growth for the first twenty-four hours, and at 45° none for 60 to 72 hours (2½ to 3 days). Very little bacterial development ordinarily occurs in milk kept over night (12 hours), when it has been quickly cooled to 65° F., and well protected from dust and dirt. The point to be especially emphasized is that even if we start with but few bacteria in milk, these bacteria, if milk is warm, soon rapidly increase, and soon outnumber the bacteria in milks not so clean in first place but which have been kept cool. Indeed, uncooled morning's milk may within five or six hours show more bacteria than the milk of the night before cooled and kept at 65° F. There is an advantage in rapidly cooling milk, because then the bacteria do not start developing, while if milk is only gradually cooled development or growth starts, and the bacteria accommodate themselves to the gradual fall of temperature and do not cease development, though, of course, growth is slowed. In several experiments made with fresh milk, one portion being quickly chilled to 65° F., and the other allowed to cool gradually to this temperature (taking an average of 1½ hours), the numbers of bacteria after fifteen hours were investigated, and on the average the quickly chilled samples showed only from 40 to 45 per cent. as many as in the slowly cooled samples. Cool the milk, then, as quickly as possible below 70° F., and cool morning's milk as well as night's milk. If milk is to be kept longer than over night it is necessary to cool it to or below 55° F., which in our summer weather and with the average well water, means that ice must be used. Every dairy farmer, however, should store ice, as it is a substance readily and cheaply procurable, and easily stored for summer use. At 55° F. practically no alteration will occur in clean milk inside 36 hours that will at all interfere with its value for cheese-making purposes. Every dairy farmer should have a thermometer for use, and should be certain that the milk has been cooled and kept at temperature stated.

Mr. Barr showed a few years ago, in his work done in neighborhood of Smith's Falls, how aeration of the milk led to the development of more gassy and bad-flavored curds than when milk was not aerated. The main reason for this is, of course, that in aeration the milk is more exposed to dust, and the bacteria of the dust about stables, barnyards and roads always contains, especially in our dry summer weather, many manure particles, with their load of gas-producing bacteria. But there is another reason, and that is these gas-producing bacteria thrive better in a well-aired milk than in one not aerated, while the reverse holds true for our common (desirable) acid-producing bacteria of milk and curd.

After cooling the milk must be covered and protected from dirt, flies and other insects, as has already been stated. This is to prevent seeding with bacteria after milking, an occurrence which takes place very frequently, but which only occasionally is a cause of trouble as compared with the seeding during milking. If milk is milked in a cleanly manner, using clean pails and cans, and the milk is well cooled (below 70° F.), and kept below this temperature, there will but rarely arise any question of taint or defect.

I have not had to alter my teachings of years ago, that the greatest source of taint-producing bacteria in milk is manure and manure-laden dust. There are very evident direct paths for its entrance, and some paths more devious. Thus, once a factory is seeded, the whey vat is also seeded, and where whey is returned in the cans improper cleaning may allow the unremoved bacteria to seed the sample. Dust from hay and straw, and from the dried scum of stagnant pools or slowly running streams, are important sources of the sweet curdling and slime producing bacteria.

The color-producing bacteria are seldom the cause of trouble, and when so nearly always depend on the condition of the factory itself for source of seeding.

Cleanliness in milking and care of milking vessels, protection of milk after milking from dust, dirt and flies, and cooling well, prevent the entry or prevent the growth of these taint-producing bacteria, improve vastly the average quality of the milk and the value of the product made therefrom. The reward will more than compensate for the labor, and it is up to the dairyman to add this additional value to his product.

HINTS BY A WHOLESALE BUYER.

By Arthur Hodson, Montreal.

I am sorry to say that it has not been my privilege to attend these meetings very often, but when I have done so I have always gone back with the idea that it was a thousand pities that the dairymen of this country cannot be brought more closely in touch with the men they trade with. And I cannot see anything to hinder this Association from holding its Convention in Montreal—(applause)—and I can assure you that if you make up your minds to hold one Convention in Montreal it will give you a splendid opportunity of meeting with the merchants in the trade. I can also assure you that you will receive a right royal reception, and you will find that a lot of this misunderstanding that is bound to exist between the buyer and the seller, the producer and the purchaser, would be buried in oblivion if the trade could be brought more in fuller contact with the exporters.

Practical men have expressed their opinion as to improvements of dairying, and I would emphasize most emphatically that you cannot do anything to hurt the dairy interest of Canada without hurting the interests of the merchants of Montreal. You would work against your own interests, because the interest of the farmers and the interest of the merchants are one; as one prospers so will the other. Take any year that the Montreal merchant has had a prosperous and successful season. What has been the result? Prices have gone up the next year, and he has had a little more money to spend; he gives it back to you. But if prices have gone high, and the merchants have had a bad time, then you all know that you are in for a bad time the next year.

One of the vexed questions that has arisen is that of short weights. I have never met a man who does not say his weight is proper; if there is any difference in weights, he says Montreal merchants are rascals. I do not consider that proper care and attention is given to the weighing of cheese. There are certain districts where they weigh fairly, and they have a reputation in England for their weights holding up; but there are other districts in this Province where the cheesemaker, in his anxiety to get as good an average as he possibly can for his patrons, weighs as finely as he can, and if the cheese strikes a little warm spell going to Montreal they are marked down a pound. I am sure Mr. Ayer will back me up in saying that the merchants of Montreal often hold their cheese a fortnight because we cannot sell them the moment we get them. If we hold that cheese for a fortnight, and if you have given good weight at the factory and have a pound or a quarter up beam, your cheese will lose a pound. In Montreal we have to invoice the cheese to the Englishmen at a pound a box less, because they have to be re-tested, and if you were a merchant you would not like that.

We have to meet a great deal of competition. We are up against New Zealand, Australia, the Argentine Republic, and Russia, and all these people allow

beamage. That means that for every one hundredweight of cheese they allow a pound weight. The people in England say: "You do not expect us to continue paying you full price for Canadian cheese if you do not give us as good weight as we get from New Zealand." We do not want unfair weights. The Government has taken it out of our hands, and there is now no possibility of the merchants of Montreal doing you out of your proper weight.

I want to add my tribute of praise to the improvement in quality of the cheese. I consider the quality of the cheese throughout Canada has never been so good the season through as this year. There are a few exceptions, but generally speaking there is a distinct stride forward, and there never was in the history of the trade more need for it.

I am not one who is inclined to think Canada is sending its best out of the country. I think Mr. Ayer was very modest when he said he thought the consumption in England was not decreasing. I most emphatically say it is increasing, and if you go into the figures you will see for yourself that it is increasing considerably. Ten years ago there was hardly a cheese exported from New Zealand. This year they go close up to a million boxes, and there was also a lot of cheese shipped from Russia, thousands of boxes going in every week. I have not yet been able to weigh up to the eating capacity of the Englishman. The more cheese we send him the more he consumes, and I think there is yet a good future ahead of Canada. If you made a million boxes more a year you would be able to sell them.

When I was in Bristol last year I attended a meeting of farmers, merchants, and hog-growers, and they had a great grievance to fight out with the Bristol merchants. They claimed they had combined together and were paying whatever prices they thought for their hogs, and were selling them at 14 cents a pound, and one farmer got up and said that the prices would go down a penny a pound if they kept on producing. But I do not think there is anything of that kind going to happen in the cheese trade.

In certain sections of this country they have adopted a brand, and I think it is a good thing. If you try to sell a lot of cheese in dirty boxes, even if the quality is the finest, the buyer will say: "I do not want that lot." Prince Edward County factories have adopted a mark, and they are uniform, and there is no possibility of shoving any other cheese and passing them off as Prince Edward County cheese. I see the Belleville section are following out that same rule, and in Perth some of the factories are using the brand. I would like to see a good healthy rivalry brought out and Perth have a mark, Brockville another, and Belleville, Picton, Peterborough, and so on. I will tell you the advantage of it: There are certain factories that can get from one-eighth to a quarter of a cent a pound more for their cheese because they have gone over to England with their factory mark on the boxes, and the merchants over there have liked it so well that they will take it the whole season.

I would like to make one more suggestion. I would like to pay a tribute to the grand army of Instructors that you have in this Province of Ontario. I have had some of them come into my warehouse, and they have sometimes expressed surprise that such and such a factory were not cut, because they knew it was wrong. They would say that it made it hard for them to go into a factory and condemn cheese when the merchant pays for it in full. I am sure merchants in Montreal would like to do things, and if it was not for competition they would cut the prices of a great many of these cheese. I would like to create a little spirit of rivalry in this country similar to what they have in New Zealand, and I would

like to see every shipment inspected. I would like the dairy Instructors to create a little friendly competition, have an exhibition, and select the best factory in a district, and then see which district will come out ahead.

ADDRESS.

G. A. Putnam, Director of Dairy Education for Ontario, Toronto.

We can congratulate ourselves on the good quality of the cheese and butter that is being made in this Province, and we must remember that that entails a great deal of responsibility, and for that reason there was never a time when it became more necessary than it does at the present time to pay close attention to all these questions.

The practical discussions that are to take place and the practical addresses yet to be given are of vital importance to you, and for that reason it would be out of place for me to take up your time, because I am in a little different position to most of those who are to address the Convention. I have the privilege of corresponding with the factorymen on any particular subject that I wish to bring before them. I have observed in going from place to place throughout the Province that, generally speaking, the men who are making a success of dairying are very often following some other lines of agriculture successfully.

Mr. James, the Deputy Minister, referred to the fact that dairymen in this eastern part of the province are planting out orchards, and are also going into the poultry business. We are preaching through the institutes that we believe the combining of dairying, poultry raising, and fruit growing is admirably suited to the many sections of this eastern part of the Province, and I wish to impress upon this audience the importance of inducing the farmers not only to improve in dairying, but also to make plans for putting out orchards and for increasing the poultry output.

It seems to be considered by some that there is danger of the dairy industry declining. I do not think we need to have any fears along that line. It is an industry that ranks highest in the agricultural line in the Province, and it should have our hearty support. It may be necessary to have a readjustment. Mr. Publow suggested that we should go into the production of cream a little more largely. I think the signs point to a gradual growth in the dairy industry. In going from place to place throughout the Province it is quite an exception to get a poor piece of butter. Now, I remember that fifteen years ago it was quite an exception to get a good piece of butter. The same holds true of cheese. The home consumption of cheese and butter is increasing, and will gradually increase. There is also a great increase in the amount of milk and cream consumed in our cities and towns, and therefore I think the dairymen may rest assured that the future of their industry will be greater than ever before.

In our agriculture work in the Province we have to a certain extent gone about things in a wrong way. We spent thousands and thousands of dollars in sending out lecturers to teach the farmers how to feed their stock, and how to grow crops, and how to breed their cattle. That was all good work, but it was not until recently that we paid attention to the most important part of farming, and that was the homestead. I am glad to know that in the Women's Institute we have a force which can be used for the betterment of the agricultural conditions through-

out this Province. We have, as you know, passed legislation for the improvement of the sanitation of factories. We have required factories to be registered, and we have spent hundreds of thousands of dollars in an educational campaign, but we have left until the last the maker. It is only very recently that we are recognizing the ability of the maker. We are now issuing certificates to makers, and I think it will result in improving the industry generally.

The maker is responsible in connection with this dairy industry, and he should co-operate with the producer in his locality, not only in making his factory a success from a business standpoint, but also in using his influence among the farmers to induce them to grow crops suited to the cattle, and that will increase the production of milk. I know of individual owners who have paid considerable attention to this line of work, and we hope that the makers will each of them join in helping the farmers to increase the production of cattle, and to grow those foods which tide them over the dry months of the summer.

WHERE ARE WE LOSING MONEY IN CHEESEMAKING?

DR. C. A. PUBLOW, PICTON.

I assure you that it is a great pleasure for me to be back in the old town where I was born. I feel somewhat at home on this stage and in this hall, because I have attended a good many concerts here. I remember sitting up in the gallery and throwing a piece of pumpkin pie at a bald head—(laughter)—but I think I was never before called upon to say anything from this platform in connection with dairy work. Still, I feel that the subject of my address is somewhat appropriate to my home town. The subject is, "Where are we Losing Money in Cheesemaking?" It was at Perth that I first started losing money in cheesemaking myself, when I worked for Mr. Richard White for eight dollars a month for the first year, and my father said it cost him ten dollars a month to board me. (Laughter.)

The charts which I have on the stand before me will give in short form the headings of what I wish to say something about. Whenever we see a place to make a dollar we are usually willing to get around to make it. I have spent some time in figuring out the actual places where we are really losing money in the cheese work, and some of the figures may seem surprising. The first place where money is being lost in the cheese industry is, of course, at the farm. There are certain cows that will produce plenty of milk, but they require so much feed to do it that there is not much profit in the milk, and there is a loss in keeping cows of that kind. Then there are cows that are not constructed for milk production. We can give them the best care and feed them everything possible, and still we do not get any milk from them, because they are not intended for milk production. Unsuitable foods, too little food, high cost of feeding products not home-grown, etc., also are hindrances to profit, but I am not going to say anything about them, because Mr. Glendinning can tell you about that. Producing milk for too short a season is also a cause of lack of profit. In the majority of our factories they only run six months. Then there is a large surplus of milk on the hands of the farmer, and he has to make butter or else sell it at a very much reduced price. It seems to me we ought to have factories equipped for making butter or handling cream or milk for at least nine months in the year, because there is a lot of money being lost where they handle it for only six months.

Producing milk at the wrong seasons also means loss. There are certain localities where labor is hard to secure in the summer, and in the winter time the majority of the men are sitting around with very little to do. You all know that you should feed the cows just as cheaply in the winter as in the summer, and if so there would be a great deal more money made in dairying in the winter time than in the summer. Then there is the question of breeding or raising mongrel calves. I have used that word mongrel because it is as mean a word as one can get. It costs just as much to raise a mongrel calf as it does to raise a good one, and when you get calves that are only worth fifty cents or a dollar you are certainly out a lot of money.

Then there is poor herd management. It is also a source of loss, but I am not going to say anything further about that now because I have not milked a cow in ten years.

Losses through impure milk supply are frequent. That was brought out pretty well this morning in the experiment made in one of the factories. There are also losses in the yield from over-acid milk. I think it was Prof. Dean, of Guelph, who brought up the statement that practically as much cheese could be made from over-ripe milk as from milk that was not over-ripe. I have never believed that statement, because I have never been able to get the results that he had. I have found that the riper the milk is the more acid it forms and the more casein there is broken down. You know what happens when the milk is sour. Little particles of casein are precipitated, and that milk reaches a certain acid condition and will never coagulate. My experience has been—and it is borne out by a large number of experiments—that with much acid in the milk the casein begins to be broken down, and when you come to make cheese out of it the rennet does not have full effect on it, and it goes out in the whey.

Take also the matter of fast working. All the makers know what happens when the milk works very fast. All these things mean that the yield of cheese is decreased. I have figured the loss to be at least five cents on one hundred pounds of milk when the milk is not properly cared for.

There are also losses in the yield from gassy milk. We have the bacteriological changes which affect not only the fat but the casein as well; and then we have the extra acid that is required to overcome the gas in the making of cheese, and the little extra drying that sometimes takes place. Curds have to lay from two-and-a-half to three hours after they have been milled. There is always a lot of extra loss not only from the evaporation from the surface of the curd, but also from the whey that may run away from the curd. I hope before this meeting is over a resolution will be passed appointing a committee to inspect the proper method of paying for milk so that when we have another Convention this matter will be settled.

Losses Through Impure Milk Supply.

1. Losses in yield from over-acid milk 5c. per 100 lbs.
   - (a) Change in milk solids.
   - (b) Fast working.
   - (c) Rough handling.
   - (d) Over-drying.
2. Losses in yield from gassy milk 5c. per 100 lbs.
   - (a) Bacterial changes in milk solids.
   - (b) Extra acid and drying.
   - (c) Slow working.

3. Losses in quality from over-acid milk 5c. per 100 lbs.
4. Losses in quality from gassy milk 5c. per 100 lbs.

Losses to Patrons in Pooling Milk.

100 lbs. of 3% milk makes 8.10 lb. cheese at 11c—$0.89.
100 lbs. of 4% milk makes 10.40 lb. cheese at 11c—$1.14.
100 lbs. of 5% milk makes 12.50 lb. cheese at 11c—$1.37.

Should We Use the Fat Casein Test?

Every lot of cheese would display over moisture as soon as taken from the press, also when the cheese was ten days old, and that is the average of the 200 lots. It is quite plain that patrons who have rich milk are losing money. That is the result of actual factory work. You will notice that from the 3% milk we get 2.7 pounds of cheese for each pound of fat, and the difference between 3% and 5% is a difference of 2-10 of cheese per pound of fat, and that is not very much.

Then we have the loss in the use of starters, the loss in cheese quality from their abuse, or in using too much starter or using starters that are of bad flavor. Your instructors have been able to give you all kinds of work on that, and you have your own experience. There is loss in over-acid milk if you use a large amount of starter and allow the milk to become over-ripe before adding rennet. You give the same effect to the milk as if it was over-acidity that had come in. It seems to me that we may be wrong in our method of the preparation of the starter, and that if we can save one hundred pounds of milk per day by proper preparation of the starter it would pay to do it. Then there are losses in the method of preparation.

Losses by Not Pasteurizing Whey per 100 lbs.

——	Fresh Whey.	Value.	24 hr. Raw Whey.	Value.	24 hr. Pasteurized Whey.	Value.
	lbs.	cents.	lbs.	cents.	lbs.	cents.
Sugar	5.00	5	4.00	4	4,95	4.9
Lactic Acid	.20	.....	1.20	.....	.25	.....
Albumen	.70	1	.70	1	.70	1
Fat	.20	1	.....	.....	.20	1
		7		5		6.9

I have placed the value of whey milk at seven cents a pound. We have five pounds of sugar. If you buy a pound of milk sugar you cannot pay for it a cent a pound, and we understand from those who know something about animal husbandry that a pound of milk sugar will put as much fat on a hog as a pound of fat. After the whey becomes 24 hours old we find that one per cent. of the sugar is used up in the form of acid, the whey becomes sour, and one pound of that sugar in every one hundred pounds of whey has been converted into acid which has absolutely no food value. In fact it has some detrimental value on the digestive system of the animal, so that we lose one pound of fat.

I have allowed for the cost of pasteurizing whey at 4/10 of a cent. per hundred pounds, or four cents a thousand. I have deducted that, and then I have taken the difference between the value of the sweet whey and the pasteurized whey after

the cost of the pasteurizing has been taken out, and we find there is a difference of one and a half cents on every one hundred pounds of whey. That means that these factories that are not pasteurizing the whey are losing one and a half cents on every one hundred pounds of whey. In a factory handling ten thousand pounds of milk a day they are losing $243 during a season of six months by not pasteurizing the whey.

The following statement shows the losses by employing cheap cheesemakers, based on two seasons' work at our factory, and from chemical analysis of the whey:

The cheap man loses .30 lbs. fat in 100 lbs. whey.
The careful " .12 " " "

Difference .18 " " "

Each handles 10,000 milk per day for 180 days, equal to 1,620,000 lb. whey during the season. During the season the cheap man loses 2,916 lbs. fat, equal to 7,581.6 cheese more than the careful man, which at 11c per pound equals $833.97. When I figured that out it certainly was a surprise to me.

SENATOR DERBYSHIRE: Would he lose in the quality of the cheese as well?

DR. PUBLOW: Probably in the same proportion.

MR. SINGLETON: At what part in the manufacture would the greatest loss occur?

MR. PUBLOW: Probably handling the milk in order to get through too early or working too short hours. I think that one of the greatest losses is in handling the curd roughly in order not to have to pay a cut for acid cheese. These are losses connected with the actual workmanship of the man. The next chart I have is:

CAREFUL METHODS *vs.* WHEY BUTTER.

Loss of fat in whey for whey butter	.30	
Loss of fat in whey in careful methods	.12	
.30 lbs. fat will make .33 lbs. butter at 24c, equals	8c	
Cost of .33 lbs. making at 8c. equals	2.66	
	5.33	
½ to maker and ½ to patron equals 2.66c each.		
18 lbs. fat represents .47 cheese, at 11c, equals	5.2	
Cost of manufacturing	.75	
	4.45	
Value of .12 fat in whey	.10	
	4.55	4.55
		2.66
		1.89c.

Net profits to patrons in favor of careful methods 1.89c. per 100 lbs. whey.

You see that the loss of cheese is much greater than a pound of fat, because in cheese we have fat, casein, and water. If we lose the casein we have got to lose fat, because they are so incorporated in the milk that when we lose one we lose the other. Then we also lose the amount of moisture that we would also incorporate in the cheese, so that we lose .18 pound of fat where we lose .47 pounds

of cheese. If you figure that out at 11c, it makes 5.2c. I figured the cost of manufacturing at one and a half cents, so that the value of the .12 pounds of fat in the whey is 10c. The actual saving by careful methods is 4.55, and if that was as far as we went we would have a pretty good story. Up in Prince Edward County the factories give away 1/3 of that. The factory gets 1/3 and the patrons get one cent. The patrons get 4.55 for the one hundred pounds of whey. If the factoryman is making whey butter and giving it to the patrons, the patrons only get half; so that the net profits to the patrons in favor of careful methods would be $1,89 for one hundred pounds of whey. The factories are losing through one channel or another at least one half a million dollars a year through poor business management or careless work in manufacturing. That is only an estimate, but I believe it is perfectly safe. It is my personal opinion that the cheese factories as a rule are the most poorly managed business concerns that I know of. There are very few factories that have a factory manager.

Losses Through Poor Business Management.

1. Having no factory manager.
2. Failure to adopt modern ideas and practices.
3. Losses in curing cheese.
4. Losses in not paraffining cheese.
5. Losses in being compelled to sell each week.
6. In supplying poor cheese to home market.
7. Making only one style of cheese.
8. In having only one cheese market.
9. Lack of co-operation in purchasing supplies.
10. In the use of cheap furnishings.
11. Lack of advertising.
12. Failure to keep daily records of manufacture and yield.

Consider the losses in being compelled to sell every week. If you have not a good curing-room, and if there is hot weather, you are obliged to sell the cheese each week and the buyers know that you are bound to sell at a certain day, and they will buy them for ¼ cent a pound less. Then there is a loss in not supplying good cheese to the home market. It is a custom to send out poor cheese to the stores, because they will have a cut made on them if they send them to Montreal, and by sending poor cheese to the stores you will not increase the consumption of cheese. There is also a loss by making only one style of cheese, and in having only one cheese market.

Recently, there has been a good deal of talk in regard to the possibility of shipping our Canadian cheese to the American side, and I would like to say that I am very much in favor of either a total taking off of the tariff on cheese or a reduction so that we could ship, at least, some of our cheese to the American side. I know of a number of cases, where you can go in the stores on the American side and pay 25c. a pound for Canadian cheese. We are close to one of the finest markets in the country and we have to accept 11c. a pound for our cheese all the year; and if we were able to send our cheese to the other side we would be getting probably 13 or 14c. Do not think for a moment they would be able to ship any cheese over here. They are not able to manufacture what they require for home consumption.

A Member: We heard last night they were shipping them over here.

Dr. Publow: That man does not know what he is talking about. I have been living among the people, and I know something about the conditions as they exist, and my opinion is backed up by a number of dairy papers. A great many people thing that the difference in the duty on cream was just a little bit of a slip. There was no slip about it. That duty was changed on cream in order to enable the dairymen to fight the existence of the oleomargarine people who are trying to put oleomargarine on the market to compete with butter.

They are able to sell in New York, cheese made from skim milk for 10c. a pound. At the Dairy School we had a large surplus of skim milk, which we made into skim milk cheese, and it got 10c a pound, netting us 85c. a pound for a hundred pounds of separated skim milk. You can understand that we must have incorporated a large amount of moisture in this cheese. We did not have the fat, and we had to put in water to make them soft. The man who sold them could fool the people long enough until they ate them; but they had to eat them quickly because if you let them stand for a while they will dry up and become mealy.

I hope the government of the country will see fit to make some provision whereby the great difference between the prices we are obtaining for our cheese here and what they are getting on the American side will be changed. Suppose we had only one store in this town, and we all had the one article to bring in. Say the season was good for eggs, and we all brought them in. The price would go down. If we have only the old country market for our cheese the prices are bound to go down when there is a large supply; but if we had one more market we would be able to do a great deal better.

I know that the consumers on the other side would welcome any such movement as this; because they are all kicking at the present time about the high cost of living, and they are willing to fire the Government out at Washington if they do not do something to reduce the cost of living.

Cheese that has one-half the fat taken out of it will sell for one-half a cent a pound as much as the full milk cheese that we make; so that you see good cheese is very scare, or they would not be able to get as much money for an inferior article.

Lack of co-operation in purchase of supplies is a source of loss. If the makers would get together early in the season they would be able to buy their supplies much cheaper. I think the weakest thing we have in factory management to-day is that we do not keep a daily record of the work. Is there a maker in eastern Ontario who knows at the close of the day whether he has done the best work he can do. For instance: I am a maker and make a certain amount of cheese, and the next day I make another batch. Do you know whether you have done the best work you can? How much fat you have lost in the whey? Do you know how much you got from one hundred pounds of milk? I think the proper place to find out these things is at the factory. If you take twenty factories in a certain district when the pay sheet comes out for the month you will find that there are no two factories that pay exactly the same amount. One will pay 85 or another 85½ or another 88c. Do you know whether the fault is in the manufacture or in the milk or in some other condition? Is there a maker who can go to his patrons and say, "I have gotten everything possible out of the milk." Or can you prove to your patrons that the reason you have not paid as much as other factories is that you have not received as good milk as the neighboring factory. Is there a man in the audience who has yet found a successful way of handling yeast so it will not appear in the cheese at any time? Is there a man who has been able to solve the question of getting rid of the long hours in connection with the making of cheese, if the milk is not

in good condition? We have always been taught that we are never able to make good cheese from pasteurized milk. I spent some time in connection with that, with the result that some of our cheese made from pasteurized milk won three prizes during the past year. If the maker would do as he ought to, and keep a record of his milk, net the yield of cheese, keep a daily record of the manufacture, and examine the cheese before it goes out, he would not only educate himself, but he would be an influence that would help very much in bettering his position in the factory. He would be able to show the patrons whether the loss in the factory was due to his work or to the work of others.

These are some of the things that appeal to me as being the source of where money is lost in the cheese industry. (Applause).

BUTTER-MAKING.

L. A. Zufelt, Dairy School, Kingston.

In discussing this subject, it will be necessary for us to take into consideration only that portion of the milk which is made use of in the manufacture of butter, viz., fat, or, as it is more commonly called, butter-fat.

This fat is in the form of tiny globules held in suspension in the new milk. That is to say, the fat and the milk serum, or skim milk, are simply mixed together in the form of a mechanical mixture, not a chemical compound; and it is owing to this fact that we can so easily separate the fat from the remainder of the milk in the form of cream. These fat globules vary in size, the average being about 1-5000 of an inch in diameter. They are largest at the beginning of lactation and gradually decrease in size as this period advances. We also find that the different breeds have pronounced characteristics in regard to their size as well as the individual animal.

The fat of milk is a combination of several kinds of fatty acids united with glycerine, each having characteristics peculiar to itself. We find, however, some of these fats have certain properties in common, and for this reason may be classified under the heads volatile, non-volatile, hard, and soft fats.

The following is a list of the chief fats, with the average percentage of each:

			Per cent.	Melting point.
Volatile, 8 per cent.		Butyrin	3.85	
		Caporin	3.60	
		Capyrin	.55	
Non-volatile, 92%	Soft	Caprin	1.90	
		Laurin	7.40	
		Olein	35.00	41° F.
	Hard	Myristin	20.20	129° F.
		Pulmatin	25.70	142° F.
		Stearin	1.80	150° F.
			100.00	

A peculiarity of butter fat is that whilst it is in a liquid condition when drawn from the cow it requires to be cooled below 70° F. before it solidifies, and if melted again it remains liquid at a much lower temperature than formerly. The average melting point is at about 93° F., but this varies according to the proportion of hard and soft fats present. This accounts largely for the variation in the churning temperature of different creams. The percentages of the different fats are largely influenced by the period of lactation, season of the year, and nature of the food the cow receives.

The fat butyrin is the distinctive fat of milk and that peculiar flavor so characteristic of butter is due to its presence. It is the most important of the volatile fats and is the least stable. Under ordinary conditions it is not volatile nor soluble, but as soon as separation takes place, due to the action of micro-organisms, or the effect of light and air, it then becomes volatile and passes off in the form of gas. The breaking up of this fat is the chief cause of rancidity in butter. The detection of adulterated butter or substances such as oleomargarine is due to the absence of these volatile fats.

The natural color of milk or butter is attributed to a substance called lactochrome, which is found in all growing plants and is closely associated with the fat palmatin. Olein, the chief of the soft fats, is also highly colored, and to these two the color of butter is largely due.

Another characteristic of butter fat is its power of absorbing all kinds of odors, not only from outside sources, but from the food which the cow receives. This emphasizes the importance of keeping the milk and cream in an absolutely clean place and feeding only such foods as will impart no undesirable flavors.

The specific heat of milk is less than that of water. That is to say, if it takes 100 units to heat a quantity of water to a certain temperature, it will take only 94 of these units to heat the same quantity of milk, 70 for cream, and 40 for butter to the same temperature. At the same time, whilst it takes less heat, it takes a correspondingly longer time to do so. In other words, the fat is acted upon by heat or cold much more slowly than the other constituents in the milk.

Ripening Cream. In manufacturing butter the chief aim of the maker is in producing the desired flavor, and ripening cream simply means the development of flavor. This flavor seems to be closely associated with the growth of the lactic acid germ, and may be gauged by the amount of lactic acid present. Besides improving the flavor, the acid seems to have other beneficial effects by overcoming the growth of injurious micro-organisms which may be present. This is especially noticeable in milk or cream which is just beginning to turn sour, when a most pronounced disagreeable flavor is developed, which gradually disappears as the acid becomes more fully developed. This is perhaps the chief reason why butter made from cream in which the acid has only been partially developed goes off flavor so quickly.

There are two systems usually employed in the ripening of cream, viz., natural and artificial.

Natural, by allowing the cream to sour naturally and controlled by the variation of the temperature.

Artificial, by the addition of a pure culture (from 3 to 10%) to the natural or pasteurized cream. Where the natural cream is of good flavor, and has been produced from good clean milk and a pure culture used, pasteurization is of doubtful benefit, for in pasteurizing we not only kill all the germ life but drive off a considerable portion of the volatile fats which give us the characteristic flavor so desirable. On the other hand, we find from experience so little milk that is properly cared for

and so much which is really inferior that pasteurizing is almost always necessary to produce a uniform high grade of butter.

In using pure cultures or starters, it is preferable to add them to the cream as early in the day as possible—the cream ripened at a temperature of from 60° to 70° F. to the desired stage, then cooled to churning temperature the evening before churning. This allows the fat to become thoroughly solidified and produces a much firmer body than if cooled just before churning. The ripening temperature varies at different seasons and under varying conditions. A safe guide is to ripen at as low a temperature always as is consistent with good results. Usually when the cream shows from five to six-tenths per cent. of acid at the time of churning gives the best results, but this varies according to the percentage of fat in cream.

Churning. Churning is simply the application of concussion to the cream, which brings two or more of the fat globules together, when they unite. When sufficient of these have united so as to be visible we call them granules.

The churning temperature is the temperature at which the globules will adhere to one another. If the temperature is too low, they strike and go by without adhering, and the temperature must be raised until the fat is sufficiently soft so as to stick. If the temperature is too high, we are liable not to get an exhaustive churning, the butter will be soft, and excessive amount of casein may also be incorporated. No fixed churning temperature can be given. It depends largely on the proportion of the hard and soft fats present, and the degree of ripeness and richness of the cream. Each butter-maker will have to determine this for himself, with this provision: To churn at as low a temperature as is possible, providing it does not take over from three-quarters to one hour to do so. When the churning is completed the granules should be the size of wheat or slightly larger, and not smooth but ragged in appearance.

Sufficient water should be added to wash out all traces of buttermilk, and at a temperature to leave the butter sufficiently firm for working.

Salting and Working. Working is for the purpose of compressing the granules into a more solid mass, to more evenly distribute the salt, and to remove excessive moisture. Salt is added to improve the flavor and add to the keeping qualities of the butter. In working care should be observed that no undue friction is employed, as otherwise the grain may be injured and become greasy or salvy.

Packing. No other article of food, perhaps, by its appearance affects our senses to such an extent as does butter. Too much pains, therefore, cannot be taken to make the butter have an attractive appearance. If we are making bricks, see that they are *square* and neatly wrapped. If we are making solids, have the boxes *clean,* and the butter packed in *solid,* without any holes or vacancies in the corners. The air should be thoroughly excluded and the butter stored in a clean place, where the temperature can be maintained at or near freezing point, if to be kept for any length of time.

I have endeavored to touch on only some of the more important principles of butter-making. It is impossible to go thoroughly into all the different phases of this subject in the time at my disposal. I trust that a discussion will emphasize the points I have already touched on and bring out others which I have unavoidably left out.

A Member: Does Mr. Zufelt think that keeping butter at a low point has any effect on the keeping quality. This year we stored all the butter at a temperature of 22°, or 10° below freezing.

Mr. Zufelt: I believe it is the practice of the dealers when storing butter any length of time to keep it below the freezing point.

A MEMBER: A good many of the merchants will tell you that if you store butter below the freezing temperature after it comes out of the storage it will go off in flavor more rapidly than if kept just about the freezing point.

MR. ZUFELT: I have never had any experience in that, but there is no question that butter that has been stored for quite a long time appears to go off condition much more quickly than fresh butter does. As a rule, butter that is kept for a long time in cold storage does not keep as long after it has been taken out of cold storage as it would from the start.

A MEMBER: Does freezing have a tendency to spoil butter?

MR. ZUFELT: I would not say that was due to freezing.

RECIPROCAL FREE TRADE IN DAIRY PRODUCTS.

MR. WILSON: The Committee on Resolutions have a short report ready: Moved by JOHN W. HYATT, seconded by J. R. ANDERSON, "That the Dominion Government be respectfully but most strongly urged, in the negotiations now pending between Canada and the United States, to provide for complete reciprocal free trade between the two countries in all lines of dairy products."

ADDRESS.

MR. J. R. DARGAVEL, M.L.A., Hon. President, occupied the chair at this meeting, and said: The Chairman is not expected to make a long speech at a meeting of this kind where there are so many eminent speakers, but I would like to congratulate the people of Perth on the success of the meetings that have been held here, and on the magnificent manner in which this hall has been decorated. You certainly have some artists in the decorating line in the Town of Perth. After paying a compliment to the local member, Hon. Col. Matheson, Provincial Treasurer, for the interest he had shown in, and the help he had given the Dairying Associations, Mr. Dargavel proceeded: I will now go back for some years in the history of the work in the Dairymen's Association of Eastern Ontario, which was formed some 40 years ago, for the purpose of improving the methods of dairying and manufacturing cheese and butter. For many years it was a very small Association, and its influence developed slowly until some fifteen years ago. We had then eight Directors, and the factories had to bear the expense of the work. The trade grew rapidly, but the means of providing for the instructors did not grow so fast.

Hon. Mr. Dryden, Minister of Agriculture, helped us in his time, but we were unable to increase the number of instructors to more than twelve or fifteen; but now we have twenty-six instructors covering the ground. Up to two or three years ago we gave instruction only to those factories that had contributed something towards the expense. Each factory was taxed $15. The instructors were doing splendid work, but we found that we did not do all that we should, and that the very factories that needed the instruction most were the ones that did not take advantage of it. Our cheese as a whole suffered very much in reputation by reason of a certain quantity going over to England of an inferior quality. The problem was to reach these poorer factories. We had a good many meetings of our Associations, and the directors talked the matter over with Mr. Publow and Mr. Herns,

the Chief Instructors from Western Ontario. At that time the Hon. Mr. Monteith was Minister of Agriculture, and I went to him and asked him to take over the instruction and pay the whole shot, and then we could give instruction to the factories. He simply laughed at me at first, and said that would be impossible. It would require a large amount of money, and the Government were doing already all they possibly could do in that line. He said: "I concede the point you made so clearly. It is a very good one, and we would like to do what you ask; but I feel certain that the Provincial Treasurer would not find the funds for this increased expenditure." I said to him: "Have you any objection to me going and talking it over with Col. Matheson?" He said that I could go, but that it would be no use. However, I went to Col. Matheson, and told him what I told you people to-night—of the absolute necessity of reaching these other factories. I told him how important it was to the whole cheese industry, and he said to me: "Mr. Dargavel, I will consider this matter." I went away from him and went to the Hon. Mr. Monteith, and I said: "I have won the day." He said: "No." I said: "Yes." I knew when Col. Matheson said he would consider the matter it was pretty well agreed, because he usually tells us quite plainly when we go to him with some application that we cannot get it.

In a couple of days I went back to Col. Matheson, and he said: "I have considered that proposition, and knowing the immense benefit that will accrue to the dairymen of Ontario, I have concluded to grant it." (Applause.) That opened the way for the greatest amount of good that could possibly come to us through our instructors, and I am quite sure Mr. Publow will back me up in saying that the quality of the cheese as a whole has been wonderfully improved in the last three years. There is no man who deserves more thanks for this than the Provincial Treasurer, and I am glad to be able to make this announcement right in his home town. (Applause.) To-day we are sending over to the English market branded as Canadian cheese an article that we are proud of, and it is inferior to no cheese that is sold on the British market. There is still a little difference in price between the Canadian cheese and the English cheese, but that is a matter of sentiment with the Englishman.

We have with us to-night the Hon. Mr. Duff, who has come all the way from Toronto to address us. He has been here for a couple of days attending the meetings and listening to the speeches that have been made, and there is no man in the House of Assembly at Toronto who is more eager and willing or more desirous of assisting the agriculturists of this Province than he. His only business in life is farming, and he knows the need of the agriculturists; and although the locality from which he comes is not so much a dairying district as a grain-growing district, he has lost no means of acquainting himself with the wants and wishes of the dairymen. The dairymen have made me a kind of go-between between them and the Government for anything they require, and I have never gone to Mr. Duff but what I have been met in a kindly spirit, and he has always agreed to do all he possibly could for us. Then we have Mr. Creelman, President of the Guelph Agricultural College, an institution of which every resident of the Province of Ontario is proud. It is doing wonderful work for the agriculturists of this Province, and at the present time it is doing great work for the women as well as the men. I hope some of your citizens from the County of Lanark are taking advantage of that institution, and acquiring knowledge as to the best way of managing the household.

THE CARE OF MILK FOR CHEESEMAKING.

Geo. H. Barr, Ottawa.

Experiments on the care of milk for cheesemaking were conducted by the Dairy and Cold Storage Commissioner's Branch, Ottawa, at the Rideau Queen Cheese Factory, Smith's Falls, in 1908, the milk from two farms being used. Two small vats were installed at the factory, with all the other utensils necessary for manufacturing cheese.

No attempt was made to secure information from a bacteriological standpoint, but rather to discover what effect different methods of handling the milk at the farms would have on the quality of the curd and cheese.

The principal points kept in view were to ascertain the advantages or disadvantages of aerating, cooling and aerating, and cooling the milk without aeration, all under ordinary farm conditions, and if possible discover a simple, convenient, inexpensive, and effective method of treating the milk, so that it might be delivered at the cheese factories in such a condition that the cheesemakers would not have to contend with gassy and other undesirable fermentations during the process of manufacture, or suffer losses from unclean flavors in the cheese.

The general routine of the work was as follows: In the evening the writer and his assistant went to the farms in time to take care of the milk as it was drawn from the cows. The milk was divided equally into two milk cans marked A and B, and the treatment given the milk in each can varied from time to time. We treated the milk at both farms exactly alike each evening. We did not do anything with the morning's milk at the farms. It was not cooled or aerated.

The milk was delivered at the factory by the owners, where it was weighed, and samples taken from each can for the Babcock test, Acidimeter, and fermentation curd tests.

The A and B cans of the evening's milk were put into A and B vats, respectively, and the morning's milk, when delivered separately, was divided equally between the two vats.

The cheese were made according to the best methods practised in our cheese factories.

The cheese were kept in the factory curing-room for twelve or fifteen days, then shipped to the Ottawa Cold Stores. The curing-room was of very ordinary construction, the temperature going as high as 84 degrees in July. The average temperatures were for June 71, July 72, and August 68 degrees.

The cheese were tested for flavor and texture just before shipping from the factory, and again on September 21st in the Ottawa Cold Stores.

The cows were always milked in the stable at both places. Mr. Hyslop's stable was frame and Mr. Condie's a stone basement under the barn. Both had wooden floors, which could not be considered by any means as sanitary as cement. The walls, ceilings, and floors were dusty.

The milking was done at Mr. Hyslop's by his four sons. The milk was poured into a strainer pail in the stable, carried to the stand and strained into the cans. Mr. Condie and his two hired men did the milking at his place. As the cows were milked the milk was strained into shotgun cans standing behind the cows and then carried to the milk stand.

At both places bright tin milk pails were used. No special regulations were asked for in regard to milking or feeding the cows, our object being to take the milk as they gave it to us, and see what result different treatment at the farm

would have on it when manufacturing it into cheese. Lantern slides were used to show the milk stands and also the condition of the curds.

Mr. Hyslop's Milk Stand. This stand is close to the icehouse and is 60 feet from the cow stable door. This space is in grass and fairly free from manure or dust. On the other side of the stand is the orchard and backyard of the house. It is probably a little too close to the stable, and the buildings and orchard prevent getting the full benefit of the wind from all directions, yet it is better situated than hundreds of milk stands throughout the country. Everything around it was kept clean and tidy. Notwithstanding the comparatively favorable location of this stand, 38 per cent. of the curd tests from milk dipped or run over an aerator here were gassy and not clean in flavor. The experiments in cooling the milk without aeration at this farm were made on this stand, or on the waggon standing beside it, and only 6.6 per cent. of the curd tests from the cooled milk were gassy and not quite clean in flavor.

The Milk Stand at Mr. Condie's. It is at the end of the woodshed, in the corner of which is stored the ice. A roadway runs between it and the house. The horse stable is about 40 feet distant, directly in front of the stand, and the barnyard and cow stable on the other side of this about 136 feet from the stand. A hog-pen is situated 88 feet from the stand, a short distance from the other end of the woodshed. This stand may be considered in a good location, as there is good circulation of air. There is, however, a little more dust around it than at the Hyslop stand. Sixty-one per cent. of the curd tests from milk aerated on this stand were gassy and not clean in flavor.

Where the milk was cooled by setting the milk can in a tub of water at Mr. Condie's. This platform is in the corner of the barnyard. A corner of the horse stable is seen to the right. The cow stable is directly in front of this trough, about 96 feet distant. All around this trough is bare ground, where the cows often stood both before and after milking, and in dry weather it was very dusty. The manure pile from the horse stable is about 52 feet from this platform.

The pump is situated behind the horse stable, 93 feet from the trough, and the water piped underground to the trough. A gas pipe was put into the upright pump log to carry the water to the tub at the end of the trough, and a spout fixed from the tub to the trough. All the water pumped for the stock had to pass through this tub, flowing out at the top into the trough. By this arrangement not five minutes' time was required to take care of the milk cooled in this manner, for when enough water was pumped to water the cows, the milk was cool enough to leave for the night. Only 6.6 per cent. of the curd tests from milk cooled without aeration on this platform were gassy and tainted, while 71 per cent. of the curd tests from milk aerated in the same place were gassy and tainted, and some of them were "floaters."

The word "aeration" used in this connection means the exposure of the milk to the air, either with a dipper or by running it over an aerator.

The milk cooled as shown in the last two columns was not dipped and scarcely ever stirred except to get the temperature. The covers were put on the cans immediately after milking was finished.

The work was continued at the same factory in the following year (1909); but instead of using the milk from two herds and taking care of it ourselves, as we did in 1908, we arranged to use all the milk delivered to the factory by the forty patrons and make it up in two separate vats. The patrons very kindly agreed to treat their milk according to our instructions, and by dividing them into two

groups and giving each group different instructions from day to day, we were fairly successful in securing one vat of sweet, clean flavored milk, and one of overripe or tainted milk each day. Our instructions were only in regard to the care of the evening's milk, the morning's milk being delivered in the usual way.

TABLE 1.—SUMMARY OF DEFECTS IN THE CURDS AND CHEESE FROM MILK TREATED IN FIVE DIFFERENT WAYS.

—	Milk aerated by dipping.	Milk run over an aerator.	Milk aerated and cooled.	Milk cooled with water in shotgun can.	Milk cooled in tub of water.
No. of Curd Tests	18	22	18	10	30
Not clean flavor	83.4%	68.2%	44.0%	10.0%	6.6%
Gassy Texture	77.8"	68.2"	44.0"	20.0"	6.6"
No. of Curd Tests	9	12	10	5	15
Not clean flavor	88.9%	50.0%	40.0%	00	00
Gassy texture	77.8"	50.0"	20.0"	00	00
Cheese not clean flavor	77.8%	75.0%	60.0%	20.0%	13.3%

The patrons delivered their milk in the usual way, all delivering their own except one route of four patrons.

The quantity of milk received each day was from 7,243 to 8,316 pounds. The milk was divided into two vats through a weigh can with two compartments, thus avoiding any mixing of the good and bad milk.

Sixteen patrons delivered their evening's and morning's milk in separate cans.

Curd tests were made of every patron's milk each day, and a record kept of how each patron treated the evening's milk.

The following tables show the different methods of treating the milk at the farms and the number and condition of the curd tests and curds:

TABLE II.

Method of treating the milk at the farms.	No. of curd tests.	Clean flavor.	Solid texture.
		Per cent.	Per cent.
Cooled without aeration	279	77.41	76.00
Cooled and aerated	30	50.00	50.00
Aerated without cooling	120	50.83	62.50
Stirred without cooling	103	54.37	64.07

TABLE III.

Method of cooling the milk at the farms.	No. of curd tests.	Clean flavor.	Solid texture.
		Per cent.	Per cent.
Cooled by setting milk cans in water or iced water	116	81.03	80.17
Cooled by setting milk pails in water	98	75.51	76.53
Cooled by setting shotgun cans of water in the milk	58	75.86	70.69

It is quite plainly shown in Table II. that cooling the milk without aeration gave much better results in flavor than did any of the other methods. Stirring without cooling gave better flavored milk than did aeration or aeration and cooling, but we cannot recommend this method, as the milk so treated arrived at the factory in an overripe condition when the nights were warm.

Table III shows that cooling the milk by setting the milk cans in water gave slightly better results than the other two methods practised.

Making a curd of each patron's milk every day indicated very plainly that fine flavored milk could not be delivered to the factory in rusty or unclean milk cans, even when it was cooled.

The temperature of the air during the night had an effect upon the condition of the milk when delivered at the factory, as shown in the following table:

TABLE IV.—EFFECT OF TEMPERATURE DURING THE NIGHT ON THE FLAVOR AND TEXTURE OF THE CURD TESTS AND THE CURDS IN THE VATS.

Lowest temp. during the night.	Treatment given evening's milk.	Curd test.		Curds in the vats.	
		Clean flavor.	Solid texture.	Clean flavor.	Solid texture.
		Per cent.	Per cent.	Per cent.	Per cent.
59–60	Cooled	83.8	94.1	100.0	100.0
59–60	Not cooled	62.4	71.8	33.3	33.3
63–64	Cooled	86.6	92.1	50.0	100.0
63–64	Not cooled	46.7	68.9	50.0	100.0
65–67	Cooled	76.3	79.0	100.0	100.0
65–67	Not cooled	22.9	50.2	.....	.....
67	Cooled and aerated	52.2	55.0	.....	.....
67	Cooled only	51.0	48.5	50.0	.....
70–73	Cooled	79.5	85.0	100.0	100.0
70–73	Not cooled	31.5	42.1	.....	.....

NOTE.—The milk "cooled" was not aerated in any way. The "not cooled" milk was either stirred or dipped.

High temperatures at night had practically no effect upon the condition of the curds when the milk was cooled and covered, but had a decidedly bad effect when the milk was stirred or aerated without cooling. Even when the nights were quite cool over 50 per cent. of the curds in the vats were gassy and not clean in flavor when the milk was not cooled; but when the temperature of the night was 65 degrees and over all the curds from uncooled milk were gassy and not clean in flavor.

From the four different methods of treating the milk at the farms the condition of the curds was as follows:

TABLE V.—CONDITION OF CURDS IN THE VATS.

Method of treating the milk at the farms.	Number of curds.	Curds clean in flavor.	Curds with no gas.
		per cent.	per cent.
Cooled without aeration	16	81.25	68.75
Cooled and aerated	2	.....	.....
Aerated without cooling	6	.....	33.33
Stirred without cooling	5	40.00	40.00

This shows very plainly that cooling the milk without aeration gave by far the best results in the curds.

The loss of butter fat in the whey from milk treated differently at the farm and in different conditions when received at the factory was as follows:

	Per cent.
Cooled without aeration	.20
Cooled and aerated	.22
Stirred without cooling	.22
Aerated without cooling	.24
In sweet, clean flavored condition	.19
In gassy condition	.21
In overripe condition	.25
In overripe and gassy condition	.27

The loss of butter fat in the whey from milk cooled without aeration varied from .08 to .28, the loss increasing as the season advanced.

The loss from aerated milk varied from .18 to .20; from stirred milk, .18 to .27; from aerated and cooled milk, .20 to .25 per cent.

The small loss of butter fat in the whey from sweet, clean flavored milk indicates that there would be little profit in skimming the whey if all the milk was delivered in this condition, and the question may be asked, Does it pay to allow the milk to become tainted and overripe through carelessness, causing serious loss of butter fat in the whey, and then go to the expense of installing a butter plant to recover what never should have been lost?

The yield of cheese is calculated from the weight of the cheese as they were taken from the press. Many patrons of cheese factories seem to give more consideration to the yield of cheese than they do to the care of the milk, apparently forgetting that the condition of the milk when delivered at the factory has a great deal to do with the amount of cheese that can be made from it.

We were unable to get the milk in both vats to test the same per cent. of butter fat during the month of June, but by changing patrons from one vat to the other we succeeded in having both vats test the same after July 1st, and were able to make close comparisons of the yield of cheese from different kinds of milk, as shown in the following table:

TABLE VI.—LOSS OF CHEESE FROM OVERRIPE AND GASSY MILK.

—	Milk.	Average acidity at setting.	Average time setting to dipping.	Average time setting to salting.	Cheese.	Milk to 1 lb. Cheese.	Cheese to 1 lb. butter fat.
	lbs.	per cent.	hr. min.	hr. min.	lbs.	lbs.	lbs.
Milk in good condition ...	15,969	.21	3 19	7 51	1,437½	11.11	2.61
Overripe milk.....	15,715	.24	1 32	7 14	1,401	11.21	2.59
Milk in good condition ...	15,311	.21	2 58	7 20	1,366¼	11.20	2.63
Gassy Milk	14,673	.21	2 50	8 35	1,294¼	11.33	2.58

Loss per 1,000 pounds of overripe milk, .83 pounds of cheese.

Loss per 1,000 pounds of gassy milk, 1.03 pounds of cheese.

The loss in cheese yield from manufacturing overripe milk was not as large as we expected it would be, but it is quite probable that a greater loss than these experiments show often occurs in many cheese factories. Being strong-handed, we

were able to handle the curds to better advantage than many makers can under ordinary factory conditions, where the help is frequently insufficient for such emergencies. There are other cases in which the work is not done as carefully as it might be. The loss in handling overripe milk is due very largely to the fact that the curd in its early and tender stages must be handled quickly—which usually, though not necessarily, means roughly. If good judgment and care are exercised in doing the work rapidly, there need not be any very serious loss; but if it is done roughly and carelessly, there is no doubt the loss may easily be twice as large as it was in these experiments.

The loss in manufacturing tainted and gassy milk is largely due to the long time the curd must be held after dipping. If such milk is handled very carefully at cutting and while cooking the loss of butter fat in the whey should be about normal, but it is very difficult to prevent the loss that takes place while a gassy or tainted curd is maturing.

After two years' work, I am convinced that there is no method of cooling the milk and taking care of it on the farm that will produce fine milk, unless everything is kept scrupulously clean and the cow receives good wholesome food and water. I think it is impossible to have the finest cheese when the tank at the factory is dirty and sour, and the whey stinks when it goes home in the cans. On the other hand, I am just as convinced that if our cheese factory patrons will cool the evening's milk down to 60 or 65 degrees as soon as it is taken from the cow and cover it up, they will have practically no bad flavored cheese to put on the market. Our cheesemakers will be saved an endless amount of time and money, and it will be thousands of dollars in the pockets of factorymen and the patrons.

ADDRESS.

HON. JAMES DUFF, MINISTER OF AGRICULTURE FOR ONTARIO, TORONTO.

After complimenting the Convention upon the earnestness and enthusiasm of its work, the speaker proceeded to say: The cheesemakers of Eastern Ontario are making splendid progress. You are gradually coming to the point when every county in Eastern Ontario will be equal to the splendid position occupied by some of the factories of which Mr. Barr has spoken to-night.

In all that I have heard at this Convention nothing to my mind was so important as the address, with the lantern slides, that Mr. Barr gave to-night, because he has brought his facts directly home to every man here who is interested in dairying, and more especially to one who is interested in the care of milk, and every man may go home and do as has been outlined and tell his neighbor how to do the same. (Applause.) In my judgment, that was the most important address that has been given in connection with this Convention; and it has been told in such a way that every person can understand just exactly what is necessary to be done. That is just exactly what we are trying to do to-day in the Province of Ontario, through the Department of Agriculture, over which, for the time being, I have the honor to preside.

Some few years ago the present Prime Minister called the attention of the Government of that day to the fact that although the Agricultural Colleges were doing splendid work and were turning out splendid men; yet there were few people who could avail themselves of the privilege of attending our College, it being situated in a section of Western Ontario far from the people of Eastern Ontario.

Except during annual excursions, people as a rule saw little and knew little practically of the College. Hon. Mr. Whitney contended that some scheme should be evolved whereby the work of that College would be brought home directly to the people, and promised that he would do that, and he did it. It is an experiment which has proved to be of great advantage, and has been so popular that to-day almost every county in the Province is clamoring to have a district representative placed in its midst, and we already have in the field fourteen of them. All that occurred to me to-night when Mr. Barr was explaining these slides in connection with the care of milk. He was just doing for you people what our district representatives are doing—Mr. Hamer in the County of Lanark, Mr. Campbell in the County of Dundas, and the other gentlemen who are engaged in that work in the different counties of Ontario.

I must congratulate you, not only on the success of the Convention, but on the hospitable manner in which you have been taken care of by the people of Perth. (Applause.) We may be farmers, we may be lawyers, or we may be doctors, but, irrespective of what our different callings may be, we are all Canadians. Our interests are more or less intertwined, and you cannot hurt one part of this great commonwealth without to some extent injuring another.

We have become part of that great co-relationship between farmers and patrons and the manufacturer and the consumer. We have made splendid progress during the last few years, and for that reason—and I am not going to discuss politics—I think our people should be very careful at this very critical juncture in Canada unless we commit ourselves to something and some phase of trade relationship for which we may afterwards feel sorry. (Applause.)

Has it ever occurred to you what the home market means to the people of Ontario? I will go further and say, has it ever occurred to you what the home market means to the people of Canada? I know there are men who say it is only a myth, but there is undisputable evidence that at least between 75 and 80 per cent. of the products of the farms of Canada are used by the people of Canada. Surely the home market is a very important matter.

What made our home markets? It is the fact that we have towns like Perth and other places throughout Eastern Ontario and large cities like Toronto and Hamilton and London further west, that are growing by leaps and bounds. There are practically a million people in the cities between the line drawn from Toronto to Midland, including Toronto, in Western Ontario. Practically half the population of Ontario are consumers of the products that are grown on the farms of the Province. (Applause.)

You remember what Mr. James told you last night about the production of cows. If we look along the different lines that have been followed with such success so far as the farmer is concerned during the last few years, we will see that the farmer, if honest with himself, must come to the conclusion that the home market is the market that has made his money for him. We can afford to export only 20 or 25 per cent. of the products of our farms, for between 75 and 80 per cent. is consumed at home. I am only speaking of this because of what is in the air, and in order that the farmers and those that have trade matters in hand will sit down at home and carefully consider the situation, and see how it affects them and how it will affect the great industrial class of Ontario and of Canada. What has brought us to the splendid position that we occupy to-day, and which we have built up by ourselves? Because whatever else may be said, we owe no compliment to the great Republic to the South of us for the splendid position that we occupy to-day. (Applause.) There is not on the pages of history the first act of friend-

ship to us in trade matters, so far as the great Republic is concerned. We are good neighbors, and we respect them as such, and I will tell you what I think ought to be done. This great country of ours that has grown up under that protective policy initiated by Sir John Macdonald and continued by the Government of Sir Wilfrid Laurier, I believe that when we have reached the magnitude that we have reached at the present time, we should say to our good friends to the South: "You have a rail fence 42 rails high, and our fence is only 27, and the people of Canada during the last ten years have paid $1,600,000,000 over there; 7,000,000 of our people have bought $1,600,000,000 worth from the Americans, and how much have the 90,000,000 bought from us? Just exactly half of what our seven millions have bought from them. These are things that every man who has the welfare of Canada at heart, no matter what his politics may be, should think out carefully before he commits himself to something that may detract from the splendid position we occupy to-day.

Why is it that our cheese is not going into the American market? It is no fault of ours; but because the Americans desire to protect their own people to the extent of the duty they put upon our cheese. If they want our cheese, and if it is in their interest, that they should have it, they will lower the fence and our cheese will go in; but we should not put forth one effort to do that unless it suits ourselves. We should take care of our tariff to suit our own conditions, and let our American friends take care of their tariff as it suits their conditions. Then each can go on in splendid rivalry, but as good friends, each minding their own business, with the dignity that belongs to those who love their country, as we love our country with our allegiance to the British flag and all the traditions that cling around it. (Great applause.)

I desire to emphasize what has been said by your chairman, Mr. Dargavel, in relation to the Hon. Provincial Treasurer. It has been my good fortune to have been a member of the House since 1898. He was one of the first members I met on entering the House. Our acquaintance during the years has ripened, and I have come to the conclusion that if there is one man that the agriculturists of the Province of Ontario should be proud of, it is the Provincial Treasurer, who handles our money.

I had thought of saying a word or two in reference to Farmers' Clubs on the line of organization, and I am glad to have heard since coming here of the work they are doing. Of course I had known a good deal about it before. We have a number of Farmers' Clubs organized in this Province, particularly in the districts where our representatives have gone. This is as it should be. If they launch out with the idea of benefiting the work in which they are engaged as agriculturists the organization will be successful in so far as their individuality is expressed in the organizations, in so far as each member of the organization takes his part, and in so far as each member assumes the responsibility attached to him or her and discharge that responsibility in full. But the history of the past goes to show that when the organization starts to go afield of the work which propely belongs to it, from that moment it begins to crumble away, because it is getting on to lines where there is not that unanimity of feeling in reference to the work its members are engaged in.

I am glad to know that the Farmers' Clubs are being organized in these various counties, and I am glad to know that Mr. Hamer and the members of the Farmers' Clubs met in a beautiful room belonging to one of the citizens of this nice town. This is as it should be. It will bring about that splendid feeling that should exist between the people of the town and those contiguous to it.

THE CHAIRMAN: I am sure the audience will agree with what I said in my opening remarks. We have a Minister of Agriculture in this Province that we ought to be proud of. One who is doing all he can for the interests of agriculture.

We have another very pleasant function here to-night. The editor of *Farm and Dairying* has encouraged a farm competition that has been a very great success, and to-night we will have a presentation to the winner of the cup. This is a dairy farmers' competition, open to the Province of Ontario, and it extended over two years, in which some fifty of the best dairy farms of Ontario competed. In 1909 Mr. Begg won first prize, offered for the best dairy farm in the district east of Kingston, and last year he won the sixth prize in the final test, that was open to the whole Province. All branches of farming were judged, including the farm, home, buildings, live stock, methods of farming, management, freedom from weeds, etc.

The Committee that had charge of the competition was composed of representatives from this Association. I believe the President, Mr. Glendinning, had charge of this part of the work, and the Committee was composed of members of this Association and members of the Dominion Cattle Breeders' Association. The judges were experienced farmers—Mr. Simpson Rennie, of Toronto, and Mr. R. R. Ness, of Howick, Que. Both of these gentlemen had been winners of gold medals in former competitions some years ago. I would ask the winner of this prize to come forward to the platform, and I would ask Hon. Col. Matheson to come forward and make the presentation of the cup.

HON. COL. MATHESON: The Chairman has made a mistake in talking about the Provincial Treasurer making any grant. All the Treasurer does is to recommend as to whether the estimates are proper. Each Minister presents his own estimate and takes them to the Treasurer. If the two can agree they make a representation to the Cabinet, and then they take it to the Legislature; but if they cannot agree together they go to the Cabinet. I am quite willing to be abused as the man upstairs who won't agree to anything. I am afraid some of you think I have power to grant money. I have no such power.

With your permission, I would like to read the memorandum that has been given to me, showing the very high honor that has been awarded to Mr. Begg, that of having, as I understand it, the sixth best farm in the Province of Ontario, created by his own efforts. The memorandum which has been handed to me is as follows:

Winner of the Sixth Prize, Victor Begg, Moose Creek, Ont.: The object of the competition was to find practical farmers who, without outside assistance of any kind, had worked out on their farms the problems that confront every farmer, and who had made outstanding successes of their farm operations. The Province, the first year, was divided into four districts. District No. 1 was the district east of Kingston. Mr. Begg won first prize in this district. Last year the winners in all four districts took part in a final contest to decide the best farm in the Province. In this final contest Mr. Begg won sixth place. On such important points as "Farm Management" and "Freedom from Weeds," Mr. Begg's farm stood about first in the Province. When Mr. Begg went on his one hundred-acre farm about thirty-five years ago only about five acres had been cleared. Much of it was stony, and in the centre of it was swamp, which made it necessary for Mr. Begg to drive around two miles to get from the front to the back of his farm. Mr. Begg has cleared this farm, drained it, fenced it, erected modern buildings, including a fine silo and icehouse, installed a fine herd of pure-bred dairy cattle, converted his old log house into a comfortable modern farm home, and so increased the fertility of

his soil that to-day he is well-to-do and an example of the success that can be achieved on the farm. (Applause.)

Now, Mr. Begg, on behalf of *Farm and Dairy,* I have much pleasure in presenting to you this handsome cup as a testimonial of your success in creating the sixth best dairy farm within this Province. It has been done by your own work, and it is something of which any farmer in the Province may well be proud. (Applause.) It has been done by honest, steady, hard work, fencing the farm, draining it, erecting handsome buildings, and getting a fine herd of cattle. Mr. Begg's success has been an object lesson to his neighbors. It is something we may all hope to come to in this Province ourselves. Twenty years ago it would be difficult to find such an assemblage as is here to-day, and in your presence, and with your consent, I have pleasure in handing to Mr. Begg this cup. (Applause.)

Mr. Begg: I am a farmer away down in Stormont, near what used to be on the Canada Atlantic Railway. I started in there about thirty-five years ago with only eight or nine acres cleared, and I had a wife and three children. They have told you what women can do in cheesemaking. I do not take all the credit to myself for this farm. I must give a good part of it to my wife, and I am sorry she is not here to-night. (Applause.)

I have been a member of the Farmers' Institutes, and a President, for years. I am not a public speaker; I am a worker. I do not think that I had any more brains than any one else when I started out. I started on that farm thirty-five years ago when it was bush, and I had not a house or a barn to put my head into; but I kept working away, and I was the first man who got a cheese factory started. I do not send to the cheese factories any more. I got tired of it because there was always too much wrangling, and I am shipping my milk to Montreal.

When we first started we had to sell our butter for 10 cents a pound, and we had to haul it for thirty miles. But when we got the factory started we got about $15 out of each cow the first year, and we kept working it up and improving it until we got to $35 per cow per year, and I thought that was pretty good. During the last three or four years I have made over three thousand dollars a year. Three years ago I made eighty-four dollars and some cents per cow. Last year I made eighty-seven dollars and some cents on each cow, and this year I made $93.24 on each cow. (Applause.) And this was made clear, deducting all freight and charges. I sold other stock besides that I did not count, and what I have done anybody else can do.

I listened very attentively this evening to the lecture on the caring for milk. We started our factory using an aerator, but I threw it away because I considered it was a regular nuisance. I got up an icehouse and a tank. We milked into the can; then we strained it and put it in the tank and threw in a chunk of ice and shut it down. I have been shipping milk to Montreal for over twenty years, and I have never yet lost a can of milk.

Light and ventilation, I think, are very important in a stable. Mr. Cowan will tell you that I took the highest marks in light and ventilation for my stables. I have no grand stables; anybody could have just as good. They are not expensive, but they are well ventilated and well lighted. I always thought ventilation ought to go up, and there is where I put it. My wife helped me always. She has written a letter to Mr. Cowan's paper regarding the work on the farm. (Applause.)

H. B. Cowan, Editor of *Farm and Dairy,* Peterborough: It is very much against my will that I have been called on this evening. In fact, I left all reference to *Farm and Dairy* out of this memorandum, and was hoping it would not be mentioned at all. I think every member of the Committee who has been asso-

ciated in the competition is delighted with the results. We have discovered accomplishments on the part of these farmers who took part which have surprised us. We have discovered just such men as Mr. Begg whom otherwise we would never hear of. He has been working away quietly for years and transformed his farm until it has been an object lesson in the community. I never attended a meeting where there was such enthusiasm as there was at Moose Creek when we presented the prizes to the winners in the Eastern District. The neighbors turned out for miles around, and one of the local papers described it as one of the largest meetings of farmers held in that county. I think the reason was that the farmers around there knew these men and the farms they had, and what they had done. We had the wives of five of these farmers up on the platform, and though the meeting lasted from half-past seven until twelve o'clock no person stirred.

One splendid effect of this competition is that the neighbors of the winners have taken up the work, and it is proving most successful. I hope the good work will continue.

THE CHAIRMAN: We have one disappointment in store for us. The Hon. Mr. Fisher, the Minister of Agriculture for the Dominion of Canada, promised to be with us to-night, but our Secretary has received a telegram, in which he says: "I regret very much that I will not be able to attend the Convention at Perth. I sincerely trust that the Convention will be a marked success and of great educational value to the dairymen of Eastern Ontario. Yours truly, SIDNEY FISHER."

EDUCATION IN AGRICULTURE.

G. C. CREELMAN, PRESIDENT O.A.C., GUELPH.

The Ontario Department of Agriculture has many duties and responsibilities. It embraces under its direct supervision the following associations, societies and organizations:

The Dairymen's Associations of Ontario.
The Cattle Breeders' Association.
The Sheep Breeders' Association.
The Swine Breeders' Association.
The Poultry Association.
The Provincial Winter Fair.
The Ontario Horse Breeders' Association.
The Poultry Institute.
The Agricultural Societies.
The Bureau of Industries (Agricultural Statistics).
The Fruit Growers' Association.
The Fruit Experiment Stations.
The Entomological Society.
The Beekeepers' Association.
Farmers' Institutes of Ontario.
Women's Institutes.
The Vegetable Growers' Association.
The Horticultural Societies.
The Agricultural and Experimental Union.
The Agricultural College and Experimental Farm.

And in each case the Department publishes a detailed report of the work of these organizations. The mere recitation of the names of these organizations can give you very little idea of the work accomplished, but as it fairly well covers the range of modern agricultural activities, it will give you some idea of the scope of our work.

A mere outline of the work of any one of these Associations would give sufficient headings for a very long address; and they are all doing educational work in agriculture. I shall be obliged, however, to confine myself this afternoon to the work of the Ontario Agricultural College, and I shall refer to the other organizations only as we find ourselves co-operating directly with them.

Agriculture has now become a *science,* and a man, to get the very most out of his farm with the least expenditure of energy, must be a scientific man. In the early days in this Province it was very different. Before our forefathers could get on the soil of Ontario it was necessary to clear the land of trees, and this by purely muscular effort. When once cleared, however, there was usually fertile soil, well watered, abundant rainfall, and plenty of sunshine. All of these virtues combined assured good crops. Farming on the St. Lawrence was the same as farming in the Grand Valley. Very few varieties of crops were grown, and few implements were necessary for their cultivation and harvesting. There were practically no enemies, such as insects and plant diseases, and no weeds to share the land with the crop. Farming was a simple equation. The more boys one had the more land was cleared; the more wheat and barley were raised to buy more bush for the boys to clear. The amount of grain raised by each farmer, therefore, was in exact proportion to the amount of brawn expended by the farmer and his family.

Now, all of these conditions are changed. Continued cropping of grains has taken from the soil many of the constituents necessary for plant growth. The destruction of our forests has affected our rivers and small streams, and would seem to have even interfered with the regularity of the rainfall. Weeds have crept in from foreign countries and taken possession of the land, making in many instances even more vigorous growth in the land of their adoption than they had made in the countries where they originated. Injurious insects have come to our shores from across the ocean and from the United States, until now they destroy millions of dollars of farm crops every year. New fungous diseases seem to be turning up every year, and often threaten the total destruction of certain field or orchard crops. Varieties of field crops that were once the pride of Ontario have deteriorated, and we have constantly to introduce new kinds, give them a fair trial, and then distribute them among the farmers to replace the older sorts. Even the farm animals themselves have had to be remodelled to suit the tastes of the consumer. You can remember when dressed poultry was brought upon the market in almost any condition, with the skin torn and the yellow and white varieties mixed in the same basket. Now you demand that the chickens shall be plump, of the same season's growth, that the white and yellow fleshed varieties shall be kept separate, that they shall have been dry plucked, and that the flesh shall be tender.

Until a few years ago it was unusual to get good butter, even in the hotels throughout the country. Perfectly fresh, sweet butter, with a nutty flavor, was a luxury, indeed. It was a common expression among travellers in Ontario when they sat down at an hotel table to ask their neighbor, "How is the butter?" before taking some upon their own plates. This has all been changed. While it is true that there is much bad butter yet, it is due almost entirely to delay in transit between the producer and the consumer. Unlike cheese, butter goes off flavor from the day it is made, and yet I think I may be safe in saying that as a people we have not much to complain of now in regard to this farm product.

The evolution in our pork products has been even more remarkable. Fifteen or twenty years ago millions of pounds of fat pork were consumed every year by the people in country places, in the lumber woods, and in the mining camps. With transportation facilities, with improved machinery, which lessened much of the hard physical labor of man, and with the opening up of the British market for Canadian products, there became a greater demand for *lean* pork, and we began manufacturing an excellent sample of breakfast bacon. To-day our packers want all hogs of the bacon type, and our farmers have had to change entirely their methods of feeding and breeding hogs for the Canadian market. Where the demand was at one time for a short, thick, heavy hog, weighing 400 or 500 pounds, the trade now requires a long, thin, light pig, weighing from 160 to 220 pounds.

In the production of eggs intelligent methods have also been introduced. You and I can remember when people in cities and towns who wanted to have eggs in the winter time were obliged in the fall to put them up in boxes with salt or sawdust, in sufficient quantities to last until the hens began to lay again the next spring, as there were practically no fresh eggs to be had in the winter time. Now we have pullets hatched in February, so that they may become matured and laying hens in the following November, and with proper food and housing they continue to produce eggs all winter long; while, following the ordinary course of events, allowing the hens to hatch their brood in the warm summer time, we produced only such individuals as would lay eggs in the summer of the next year.

And so, in addition to fighting *natural enemies* and *enemies introduced,* meeting the problem of *glutted markets,* the *depreciation* of the soil from constant cropping, the *loss* of much of our strong manhood because of our young men going to the United States and to the Northwest Territories, I say, besides these discouragements and inconveniences, the Ontario farmer has had to meet and satisfy the demands of the people in our cities, whose conditions and appetites are constantly changing.

Under all the circumstances I think the Ontario farmer has met the changed conditions very well, indeed. When you remember that there is little co-operation among farmers; that he is so busy during the spring, summer, and harvesting seasons that he has little opportunity of learning even what his neighbor is doing, that the very nature of his work makes him a thinking and observing man rather than a reader; that there is little profit in his work over and above a good living for himself and his family and that, therefore, he has very little cash to spend on travel or on luxuries—under all these circumstances, it is surprising what progress has been made. And while personally I hold myself responsible for very little of the success or the present satisfactory condition of the farmer, I sincerely believe that the Ontario Agricultural College has played a large part in bringing about the present condition of things.

The Agricultural College really has three functions to perform:

(1) It accepts students from farm homes and endeavors to teach them better methods, sending them back with a knowledge of the why and wherefore of things, and as far as possible, with a knowledge of the *principles* underlying every farm operation.

(2) We have a large farm upon which we conduct experiments, and to which we invite the matured farmers of the Province to come and inspect our work.

(3) The members of the Staff attend gatherings of farmers at different points in the Province and deliver addresses on the different phases of agricultural work and take part in the discussions. They also write bulletins on farm topics, write articles for the press, and prepare an annual report on the experimental work of the year.

(1) Our Work with Students.

Field Crops.—As bread and meat are, after all, the most important foods for mankind, in the aggregate, therefore, the growing of grains, grasses, and roots for the production of beef, mutton, pork and poultry bulks very large in the business of farming; so our boys are taught first the value of better varieties of wheat, oats, peas, barley, rye, roots, hay, and pasture crops. They are told that by actual experiment the yield per acre of the first year's crop from large seeds of grain surpassed those from small seeds of grain of the same variety by 19.1 per cent., and that the yields from plump seeds surpassed those from shrunken seeds by 20.2 per cent., thus showing the necessity for planting only the largest and plumpest seeds.

They are taught that by planting *spring wheat, oats, barley,* and *peas* in the order named, one week apart, occupying four weeks in the entire seeding, that the average results of a number of years' work gave 40.8 bushels yer acre, whereas sowing *peas, spring wheat, barley,* and *oats* in the order named, that the average return was only 35.1 bushels per acre, an average difference in favor of the first order of planting of 5.7 bushels per acre. This would make a difference of 55,382,309 bushels, if applied to the whole Province, or about the same number of bushels as the entire Province of Manitoba produces each year, of wheat.

Animals.—As eighty per cent. of all our field crops is fed to live stock, it is quite necessary that we should have the right type of animal to consume this feed, or a lot of our energy will have been wasted in the growing of that feed. So our students are instructed in the feeding and breeding of all the different breeds and types of farm animals.

Botany with us means weeds, their identification, their habits, and the best methods of destruction.

Dairying.—In the dairy, students actually handle the milk, test it for quality, and manufacture it into butter and cheese.

Blacksmithing and Carpentering.—In the shop the boy is made handy with tools. He works at the forge and on the bench, not to make either a blacksmith or a carpenter of himself, but to save trips to the blacksmith's and the carpenter's shop for minor repairs in the busy season.

Horticulture.—In the orchard a student is taught grafting, budding, pruning, spraying, methods of cultivation, and the general care of an orchard.

In the class-room he is taught to properly *pack* fruit for the market, and he is told what varieties the market demands.

Poultry.—He is taught the use of the incubator, the different methods of feeding for the production of *eggs* and the production of *flesh,* the kind of houses best suited for poultry raising, how to put ducks on the market nine or ten weeks after hatching, how to care for the young chick, and so forth and so forth.

If we had time, I should like to go through each phase of the work and tell you what we are trying to do with the growing young man who is preparing himself for life and work on the farm.

It may be interesting just here to say that last year in all classes we had 1,386 students, and that they came to us from every continent, from every province of the Dominion, and from twenty-two countries outside.

(2) Our Experimental Work.

As I said before, besides running an educational institution for the students who come to us, we are also expected to do something for the fathers and older brothers who are living upon their farms at home. In order that these persons

may at least see what we are doing, we have inaugurated a system of excursions to the College under the auspices of the Farmers' Institutes. The month of June is devoted to this work, fitting in nicely between seed time and harvest. The different counties arrange with me to come on different days, and so, through the entire month, day after day, the trains coming into Guelph pour out their thousands of visitors for the College and Farm. Between 30,000 and 40,000 in all visit the College each year at this time and carefully inspect the work which we are doing. If you will bear with me for a moment, I shall give you some idea of what is accomplished in this way.

Immediately on arrival lunch is served about eleven o'clock. Eight hundred at a time are seated in the College gymnasium, and while they are being served, the President bids them welcome and outlines a programme for the day. A guide is provided for each department, and they go systematically over the farm, garden, orchard, and the lawns. They see a good farm well farmed, without weeds, and growing good crops; they find good barns and stables, well arranged and well ventilated, and containing good representative animals of the different breeds; they see in the garden all of the different kinds of vegetables that a farmer might grow, and they observe the operations in spraying for the destruction of the apple worm and fungous diseases. They see the butter-making in actual operation, and they ask questions of the butter-maker. They see in operation up-to-date farm implements of all kinds, and an opportunity is given them to thoroughly inspect and test the same. They see all the different breeds of chickens, ducks, and geese, side by side, with the Professor of Poultry Husbandry in attendance, prepared to answer all questions relating to the poultry industry.

Before leaving they are invited to inspect the lawn and to observe and take notes on the varieties of trees and shrubs that ornament our grounds. This I consider one of the most important features of the day's work. We have introduced and have now established on our campus those varieties of trees and shrubs which are best suited for our Ontario conditions, and Guelph being 1,100 feet above the sea, all of the tender varieties have been weeded out, because of our rigid climate. We point out to the farmers that if they devoted a small part of the farm, about the house and outbuildings, to the planting of trees and shrubs and the keeping of even a small bit of lawn, they will not only materially enhance the value of the whole farm, but they will make the farm home much more attractive, the lives of the homemakers much happier, and they might induce the boys and girls to stay upon the farm.

(3) Outside Work.

By our lectures throughout the country and by the publication of bulletins and reports we are enabled to go more into detail regarding better farm methods. For instance, dairying is our greatest industry in this country, and the value of our milk, butter, and cheese amounts in the aggregate to more than a hundred millions of dollars annually, and yet the difference between the average and the possible yield of milk from our dairy cows is something enormous. For instance, the average cow in this Province is said to produce 3,000 pounds of milk per year. We had a cow in the College herd last year that actually gave 20,778 pounds. Thus you see the difference between the average and the possible is about 700 per cent., and one wonders how any business can stand such discrepancies and still exist as a growing concern. The facts are that it has, as a rule, been so easy to make a living on the farm, and the farm opera-

tions were so diverse and complicated, that we have never given much specific attention to details. To-day the successful farmer is he who looks after the details, gets an extra thousand pounds of milk a year from each cow, keeps the calves only from such cows as are large producers, sees that the stables are warm and well ventilated, and that the feed grown and fed is of the kind that produces milk, *not beef*. This is the farmer who is making money over and above the cost of living for himself, his wife and his family.

Again, we publish a poultry bulletin, in which we describe the results of years of experimental work, with the different kinds of poultry houses, the different kinds of incubators, and the different breeds of fowl. We show that by careful selection, by hatching only such eggs as were laid by hens that produced a large number of eggs in a year, we were able to get a strain of large producers. We describe how we have been able to get a pen of hens that averaged 200 eggs per year per hen, while the average in the country is only 60, and we further prove that instead of going out into hen houses on Friday, grabbing whatever chickens were in sight, plucking and sending them to market on Saturday, the farmer's wife could, by selecting a certain number two weeks ahead, by shutting them up in close quarters, where they would get little or no exercise, and by feeding them on oatmeal and milk, get a hundred per cent. more money for the same chickens, which would, at the end of two weeks, come out plump and tender.

In *grain growing* we are able to advise not only the best varieties, but how to mix these varieties in order to get the best results. If a farmer is growing barley and oats for feeding, we find that he can grow more pounds of barley and oats on the same field than by growing them separately; but he has to choose varieties that ripen at the same time, and so for years we have selected the earliest maturing oats and the latest maturing barley, till now we have strains that we can recommend that will be ready for the reaper practically on the same day.

The largest yielding *wheats* in Ontario are not the best milling varieties; hence our flour manufacturers bring in large quantities of wheat from Manitoba and the Northwest each year. We realize that Ontario, if she is to hold her own, must grow wheat of better milling quality; hence we are taking our largest yielding varieties and actually crossing them in the blossom with the hard yielding varieties of the West. Out of the thousands of crosses we are getting a few that we believe will give us the quality of the Western wheat and the present high yield of the best Ontario varieties.

Again in bread making.—This is something in which housekeepers of the country are vitally interested. We have in our chemical laboratory a complete milling outfit, and samples of wheat are received every week from the grist mills of the Province. A young lady, specially trained, takes samples of this wheat each day, grinds them, separates the bran, shorts, and middlings from the flour, and then bakes a given quantity of flour into a regular loaf of bread. At the same time she has what is known as a standard variety of flour baked for comparison. She then reports back to the miller, telling him the exact value of a sample of wheat in dollars and cents for breadmaking purposes, and he charges his customers accordingly.

Experimental Union.—We have now a College Extension Organization of 5,000 members living upon farms in this Province. With them we correspond regularly, supply them with improved seeds and instructions for cultivation, and in this way not only improve their methods of farming, but through them spread to their neighbors the new gospel of Agriculture.

These are some of the things that we are doing for the matured farmer on his own farm.

I have now but one other feature of our work to mention before I close—*The Relation of the Agricultural College to the Country School.* We have long felt that if we could get hold of the child—the boy or girl of the country school—at a time when their minds were active, their eyes observant, and their hands fairly tingling to be busy all the day long, that we could start this work of improvement with the hope of better general results in the days to come. Dr. Mills, the former President of the College, wrote a text-book on Agriculture, which was introduced into the public schools, but it seemed to accomplish very little. Mr. C. C. James, the present Deputy Minister of Agriculture, then prepared an excellent text-book, but it met practically the same fate. All at once it came to us that as our teachers were largely composed of women and that the larger proportion of them came from the villages, towns, and cities, it was not to be expected that they could make very much impression upon a class of farm boys, by having them prepare and recite lessons on a topic with which the teacher was entirely unfamiliar.

We are now attempting to solve the problem in another way. For some years we have been conducting Summer Schools for Teachers at the College, and these classes are growing from year to year. Last year, and again in 1910, the Department of Education, seeing the importance of this work, arranged to select by examination about 150 teachers in training at the Normal Schools and allow them to come to the Agricultural College for the last three months of their course. It is surprising how much interested they were in it. Each teacher was obliged to prepare, plant, and care for a school garden, to make a collection of insects, plants, and weeds, to identify the common birds, the common flowers, and the common trees. They were taught to observe closely everything upon the farm and in the country round about, and really the testimonies of these teachers who write to us now would make, very, very interesting reading to the citizens of this country. They got an idea of the importance of the business of Agriculture, the possibilities of improving it, and the necessity for giving the boy and the girl in the country school an intelligent idea of the importance of farm life and work in the country at large. Another lot of teachers are coming to us again next spring, and we trust that this method may be continued until we have an opportunity of presenting our work to every rural school teacher in this Province.

I should like to have had time to say something about the work of Macdonald Institute, our Women's Department, where about 250 girls receive instruction each year in the art of home-making, and where they are kept interested, and even grow enthusiastic day by day on those subjects, and *those subjects only,* which pertain to the better management of the home. When the work was started educators all over the country said, "You cannot provide a Course of Two Years for girls unless you introduce music and art or science or literature." It is remarkable how we have succeeded without these things and how girls who come to us, in many instances with many trunks, who expect to spend a large amount of their time in changing their gowns and in entertaining their friends, soon become so wrapped up in learning the why and wherefore and the underlying principles of the sciences that pertain to home making, that they either send their extra trunks and extra clothing to the store-room or leave them at home after their first vacation.

If I have interested you at all in the work of *Agricultural Education* or the *Practical Education* of our girls along lines of *Household Science,* and if you care

to follow up the subject, looking to a practical demonstration of any or all phases of the work, I extend to you now an invitation to visit the Agricultural College, either individually or as an Association, at any time of the year, when we shall be most pleased to give you the same opportunity of looking into our work as is afforded every other citizen in this Province. (Applause.)

SECRETARY'S REPORT.

T. A. Thompson, Almonte.

Having been appointed Secretary of this Association some three months ago to fill the vacancy caused by the resignation of the late lamented Mr. Murphy, my report must, of necessity, be brief.

Seventeen District Dairy Meetings were held throughout Eastern Ontario during the latter part of November and the first of December. The attendance at these meetings was far above the average. The speakers were confronted on every occasion with well-filled halls of enthusiastic enquiring dairymen and the instructive addresses delivered by the President of the Association, Mr. Henry Glendinning, the Superintendent of the Kingston Dairy School, Mr. G. G. Publow, and the Assistant Superintendent, Mr. Frank Singleton, who were the principal speakers at every meeting, cannot fail to bear good fruit and to have a mighty influence in encouraging and promoting the Dairy industry in this part of the Province.

The Dairymen's Association of Eastern Ontario during the past thirty years has done a noble work, and much credit is due the pioneers in this work who so ardently and persistently labored to place the dairy industry of this Province in the enviable position which it holds to-day.

There is no country in the world better adapted for dairying than Eastern Ontario, and if every man interested in this great national industry would strive to do his best and each work in unison and harmony with the other it would not be many years before this part of the Province would have the enviable reputation of producing the finest quality of dairy products the world has ever seen.

The following are the names of the gentlemen who were nominated at the several district meetings to comprise the board of Directors for the year 1911, and I hope to see the selections which were made by the voice of the people confirmed by the unanimous vote of the members of this Association.

(The names, as read, appear in the list of officers given on page 5.)

I append a list of the members of the Association for the year 1911, each of whom is entitled to receive the journal known as *Farm and Dairy*, the official organ of this Association, which is published weekly in the interests of dairy farming.

During my short term of office I have endeavored to discharge the duties of Secretary and to serve this Association with all the ability and energy I have at my command.

J. H. Singleton: It gives me pleasure, as chairman of the Nominating Committee, to nominate these gentlemen whose names have been given in the Secretary's report as directors for the ensuing year, and also that Mr. J. A. Kerr be Auditor for the year 1911. The motion was seconded and carried.

RESOLUTIONS.

Moved by J. B. Wilson, seconded by J. A. Sanderson, that the thanks of this Association be and are hereby tendered to the gentlemen who so ably addressed our meetings; also to those who rendered such delightful music and singing at our evening meetings. Carried.

"That the Association expresses its appreciation of the interest taken, and the enthusiasm manifested by the Mayor, and Council and Citizens of the Town of Perth. Their warm reception and hospitality have made our visit pleasant and ever to be remembered." Carried.

"That the Association hereby expresses its warmest gratitude to the Canadian Salt Company through their general manager, Mr. E. J. Henderson, for the handsome badges presented to the members of this Association." Carried.

"That we the dairymen of Eastern Ontario assembled hereby express our appreciation for the assistance given by the Department of Agriculture for the Province of Ontario, and also that rendered by the Agricultural Department of the Dominion." Carried.

"That the thanks of this convention be and are hereby tendered to Mr. G. G. Publow, Chief Instructor, and his able staff for their very efficient work in improving the sanitary conditions of the factories, and producing a better quality of cheese." Carried.

"That as an Association we hereby express our satisfaction with the work of the Special Prosecutors." Carried

"That this Association request the Dominion Dairy Commissioner to appoint a commission of experts to investigate and consider the different methods of paying for milk delivered to cheese factories and creameries, to consult authorities and experts of other countries, and, if possible, to recommend some method that will be acceptable to our dairy authorities, and generally adopted by the dairymen of this Dominion, said commissioners to report to the next Annual Meeting of this Association." Carried.

IN MEMORIAM—R. G. MURPHY.

Moved by J. R. Dargavel, seconded by Senator Derbyshire, "Whereas it has pleased Almighty God to remove from our midst Mr. Richard G. Murphy, who for so many years faithfully served this Association in the office of Secretary, we, the dairymen of Eastern Ontario, in convention assembled, wish to express our deep regret at the loss which we have sustained, and our heartfelt sympathy goes out to Mrs. Murphy and family in this their hour of sorrow and bereavement, and that a copy of this resolution be forwarded to Mrs. Murphy."

Mr. Dargavel: I will not detain the meeting with any extended remarks. There is not a dairyman in the Province of Ontario but knew of Mr. Murphy and of his work and how he gave the best of his talents for the furtherance of the interest of the dairymen and for this Association. We very much regret his loss, and I am sure that we should all express our appreciation of his service by this resolution. It will no doubt be appreciated by Mrs. Murphy and the family.

Senator Derbyshire: I am sure we all concur in this resolution. If there was any one man who was devoted to the dairy interests, or gave more of his time or means for the promotion and elevation of the dairy business in this Province of Ontario, it was our good friend, Mr. Murphy, who so faithfully and so well served the interests of this Association. I am sure that we all concur in this resolution, and I would ask those in favor of it to manifest by a standing vote.

The entire audience rose and stood in silence.

CORN FOR THE DAIRY.

J. H. Grisdale, Experimental Farm, Ottawa.

I understand from what I have heard, and by what I saw last night, that your convention at this point has been what might be called a grand success. I have attended a good many of the conventions of the Eastern Ontario Dairymen, and everywhere we have found the same thing, indicating the great interest which the farmers and others take in this, what might be called our great national industry. I believe that interest is properly taken. I am sure that no industry can compare with dairying for prompt returns, sure returns, and continuous returns in the way of money to the farmer. Another great feature is the regular return in the way of revenue for the expenditure and the energy put into the business. In order to get good returns, we must consider not only the animal end but also the feed end of it. Every one of us who wants to make a success of this dairy business must learn how to feed cows cheaply with what can be grown on the farm. The man who undertakes to buy all the feed that he gives his dairy cows, or even a large proportion of it, is almost certain to go down to failure. That has been proven time and again. We have all seen it demonstrated in our own neighborhood. It is an utter impossibility to hope to run a dairy farm and purchase all the food that is required for the herd. In order to make a financial success of the business it is absolutely necessary that we should bend our efforts to the producing of feed at the least possible price.

The production of forage for dairy cattle has commanded our attention at the Experimental Farm for a good many years. We have tried all kinds of forage plants that have been suggested or that have been discovered. We have given them all a thorough trial. In some cases, we have tried them year after year, although we knew they were not proving a success, but still thinking we had not probably discovered the best methods of handling. We have continued them until we were sure that they could not be a success, and we have given them up and concentrated on one crop, and this one crop is almost a marvel. If someone were to tell you that a certain crop could be grown on a field, and that this crop could be grown on almost every field of your farm, and grown every year, and would produce a crop which under average conditions would give you June conditions so far as your cows are concerned the year round, and which would enable you to grow as much feed on any acre of your farm as you could grow on your very best acre under the best conditions, and that you could grow this feed of a quality and kind most suitable for your herd every year for thirty successive years, you no doubt would be delighted. I have been interested in this crop for this length of time and have been able to produce it more cheaply than any other crop that could be produced on our Eastern Ontario farms; and produce it more cheaply, not only so far as the manual labor is concerned, but with the least effort. It is a crop that can be produced almost entirely by horse power or steam power, and it is a crop that will enable you to feed in the winter with a great deal less help, and a crop that will give you forage in the winter in perfect condition for your animals to consume. It is always ready to give to the cattle without any preparation in mixing, and with nothing at all in the way of extra effort. You merely have to go to your supply and bring it in and feed it to the cattle. It is a crop that is so welcome to the animals that although they might be full to the neck with it, they will still try to get more. It is a crop that with the addition of a small amount of grain or meal, would enable you to produce milk almost as cheaply as pasture at $1 a month.

It seems to me that the average farmer would think that with all these advantages he would immediately want to know what this crop is, and how much he could manage to get in next year with the help of two or three men. We all know what it is. You all know that I mean the corn crop. That is the crop which for Ontario, Quebec, New Brunswick, and Nova Scotia is a crop par excellence for the dairyman and for the pork producer and the mutton producer. It is a crop that will enable the average farmer of this country to produce on his farm enough forage to carry twice the stock he is carrying to-day—I say that advisedly—and to carry it much more cheaply per capita than he can do it under the best conditions which he can devise otherwise. These are rather strong statements, but they are statements which we have been enabled to back up and prove over and over again on the little bit of a farm we have at Ottawa, where the soil is of an inferior character, and where the conditions are not the best—not by any means as good as you have them here and in other parts of Eastern Ontario. On that farm we have been able to prove over and over again all these points that I have mentioned in favor of this crop. It will grow on any kind of land, the only condition it exacts being that the land shall be fairly well drained—not necessarily underdrained, although I am strongly in favor of underdraining. If you can underdrain it do so; but do not say that you must wait until your land is underdrained before you can grow corn. You can grow corn crops on heavy clay soil before it is underdrained by putting in proper surface drainage. I have grown corn every season for the past thirty years without one break, and I have never seen a failure where the corn received decent attention and proper cultivation. I never saw a crop that did not pay handsomely for every hour's work that was spent upon it and gave results in the way of milk and meat production which many times paid for the cost of the crop.

It is acceptable to any class of live stock. I have fed it to beef cattle, dairy cattle, horses, sheep, and swine, and every class of live stock likes it when properly prepared, and every class will eat the whole plant if it is properly served. If you are tempted to break off the ears and keep them, do not yield to the temptation.

Q.—Is it wise to do so?

A.—No, do not yield to that temptation. Some farmers are tempted and some yield, but it is unwise. It is a crop that is available twelve months in the year. Do you know any other crop, except hay, that you can store up and make acceptable to your cattle twelve months in the year? You can probably make them eat a mouthful or two of straw, but a corn crop is always acceptable to your cattle. I can bring our cattle in off the best pasture that can ever be grown—a mixture of alfalfa, red clover, timothy and orchard grass, and a little bit of brome. no better mixture can be grown for pasture—I can take them off a pasture such as that where they were wading in it up to their knees, and put them in the stable, and they will stand in their stalls and eat the ensilage.

One would think with all these advantages in favor of corn that every farmer in this Eastern Ontario would at once order material for a silo and prepare twenty-five or thirty acres of land for corn and get busy next spring, but I regret to say that so far as I can find out, not more than 10 per cent. or 15 per cent. of our farmers are yet provided with silos. It seems to me incomprehensible why so many of our farmers fail to appreciate this great boon in the way of forage crop, and fail to use it to the best advantage.

I have stated that during thirty years, I had never seen a failure, but I may add that I came from a corn growing district in West Quebec, where they have been growing corn for over fifty years. I grew up in a corn field, and always aimed

to know how corn should be grown. My father grew corn on his farm in the Province of Quebec from the time he started to farm, when he was ten years old, and his father grew it before him. I have visited hundreds of farms in Eastern Ontario, in Quebec and in Western Ontario, and have seen the farmers attempting to grow corn under most unfavorable conditions, trying to grow it on all kinds of land that was not properly handled: trying to grow varieties that were unsuitable; cultivating it in ways not likely to produce good results and handling it badly after it was cultivated and harvesting it expensively; in fact doing everything wrong, instead of doing it in the right way. I fear that is the cause of so few growing it. I know there are a great many who have silos, but still there are comparatively few in this Province who are growing corn and putting it in the silo, and I believe the reason is because the majority of the farmers do not know how to do it properly.

The most common mistake of all is growing wrong varieties. A great many farmers are growing large varieties, and we do not want large varieties in this part of the country. We want medium sized varieties. The largest variety we can stand here, is the Leaming, and that is the variety which is likely to give the best results and give a large crop and good quality. The White Cap Yellow Dent and the Longfellow and Angel of Midnight are also splendid varieties. I do not know of anything that will beat the White Cap Yellow Dent as a corn crop to be grown by the average farmer.

Another mistake is attempting to grow the rows too closely together. The average farmer thinks when he sows his corn that if he puts three and a half or four feet between the rows, there is a lot of land wasted, but that is one of the greatest mistakes; that four feet between the rows, or three and a half feet at the very least, is the land that will give him the best results in the later days of the crop. The food in that part of the field is not utilized at once by the crop; but while the corn is utilizing the food contained in the soil immediately adjoining the row, the soil out from the corn plant is fallowing, and the plant food in that soil is kept ready and by the time the small roots project from the corn and get over to the middle, the food in the soil is ready for the roots. You will never see the closely planted corn field grow as rapidly in August as you will the widely sown corn field, because the land between the rows, where it is sown wide apart, is ready for the plant in August, and when the grain is beginning to form is the time when the plant needs nourishment the most. I want to emphasize the importance of giving the plant lots of room.

Another important point is that you must keep the land clean. There is no cause for a man not keeping his corn crop clean. If the field is dirty, the corn should be sown in hills, and if it is a fairly clean field, sow it in rows, because it is less trouble. Take five or six spouts out of the grain drill and have your rows forty-two or forty-nine inches apart. I would suggest sowing forty-nine inches between the rows, because I think you will get better results than you will from thirty-five or forty-two and infinitely better than if sown twenty-eight inches apart. From the time you sow until you pick up the sheaf to put on the wagon to haul into the silo, you will not require to touch it with the hand, as everything can be done by horse power. We have horse cultivators to-day that will do two rows at once. Mind you two rows and not a pretense of doing two rows; not merely straddling a row, and doing a little on each side of it. The old cultivator, the one that is used in probably seventy-five cases out of one hundred, cultivates only one row at a time, although you use two horses on it and do part of two rows. We have a cultivator to-day which will do two complete rows at a time and you go down the

field on two rows and back on another two rows. Farmers tell me we have had two horse cultivators doing these two rows at a time for a long time, but I tell you, you have not; you have had two horse cultivators doing one row at a time. If you will stop to consider the tremendous advantages of having a machine that will do two complete rows at a time, you will abandon your old one and get one of the new machines. It will pay for itself in one year. I got one of these machines two years ago, in order to try it, and we calculated that we saved $50 the first year. We did not sit down and say, "I guess we saved $50," but we kept track of every acre that was cultivated and what we would have had to do with the other machine; in fact we ran one of the other machines in comparison with this new cultivator. It cost us $60, so that we almost saved the cost of the machine in one year.

Another advantage was that we were able to cultivate our corn when it required cultivation. With the one-row machine, it takes a long time to go over a big field. With the two-row machine you can do it in half the time. The reason we did not have these two-row machines before, was there was a difficulty in getting a machine that would work satisfactorily. The difficulties have been overcome, and to-day we have a machine that will do the work and do it well.

Q.—Where are they made?

A.—The Massey-Harris Company are making one, and the Planet-Junior Company are making one. The Massey-Harris people have had two years experience. Last year they put two machines on the market, and I tried to get one of their machines, but was too late.

Q.—Do you have to work that machine with your feet?

A.—You can control it to a certain extent with your feet, but you should do the seeding well so that you will not have to dodge too much. Corn should be sown straight; in fact, every operation on the farm should be done well, and the better you do the first operations the more easily it is to utilize all the rows. Rows of corn should be so straight that a bullet shot out of a rifle would not touch anything all the way down the row, when the plant is six or eight feet high. It is a little difficult in doing it, but it can be done, and I will be glad to show you how to do it any time you come to the Experimental Farm. The seeder we use sows three rows at once, three and a half or four feet apart.

Q.—Can as good work be done with a large cultivator as with a small?

A.—Yes, quite as satisfactory, and at half the cost. Some farmers consider that when the corn gets to a certain stage, you cannot go through it with a two horse cultivator, but I do not agree with that.

Q.—I find I get the best results cultivating after haying. I muzzle my horses and go through the corn field and get very satisfactory results.

Mr. Grisdale: We keep cultivating the corn until we can send a man and horse through, and you could not tell where they were in the field. If a wind storm comes along and breaks the corn over, then it will not pay you to go through. If you keep it cultivated for a few weeks, it will keep the roots down and they will not be injured by the cultivation. I have given you this morning three things to attend to in the growing of corn; 1st, the importance of getting the right seed; 2nd, the importance of giving the crop plenty of room, and 3rd, cultivating it thoroughly. Now, I want to go back again and call your attention to some other points.

Q.—Should not the seed be governed by the fact as to whether we get the corn in early or late?

A.—Yes.

Senator Derbyshire: I do not believe you have devoted enough time to the preparation of this field.

Mr. Grisdale: That is what I am coming to now. I quite agree that the variety of the seed should be controlled by the season, and I do not say anything because so many farmers buy their seed in the winter or early spring before sowing time comes on and they cannot change around and buy other seed. But we frequently hold over seed on account of the peculiarity of the season. The earlier you get your corn in, the bigger the variety you can grow; and when we can get our corn in early, we sow the largest variety that we know will prove satisfactory. For instance, we will sow Early Mastodon and Leaming. We keep a supply of Early Mastodon and Leaming on hand so that we are ready to sow it if the season is early enough, but if we are delayed in the sowing, as happened two years ago, then we put some of that seed aside, although we lost a little money by doing so, and substitute another variety, and I think we are paid for our loss in the better quality of ensilage that we secure.

Mr. R. G. Laird: I believe there is just as much difference in the value of different ensilages as there is between pea corn and bran.

Mr. Grisdale: Yes, there is in the different varieties of corn. I have given you the names of the varieties that I think will give you good ensilage. You will get a superior grade of ensilage by sowing the varieties I have mentioned, and by getting them in as early as you can.

Q.—Give the names of the later varieties.

A.—The latest variety you can afford to sow in this district is Early Mastodon. It is a first-class corn. Eight years out of ten we get a good crop from Early Mastodon.

Q.—What is the difference between it and the Mammoth.

A.—That is a later variety still. We do not sow that; our standard is selected Leaming. That is the best variety for all-round corn ensilage that you can get unless you happen to have a cold soil. If you have a field that is not absolutely right for corn then I would advocate sowing the smaller variety. As a general rule, you should have your field in first-class shape, and then you can sow Leaming. But if your fields are not in first-class shape, and if the season should happen to be a little late, then sow White Cap Yellow Dent or Longfellow. We make it a rule at the Experimental Farm to sow several varieties. In our field crop of fifty acres, we sow a quarter of Longfellow, a quarter of White Cap Yellow Dent, and half of Leaming and Early Mastodon.

Q.—How do you mix them?

A.—We sow them separately. Some men mix their seed altogether, but that is not satisfactory, because when you are ready to cut your corn and you go into the field you will find the Early Mastodon, sown at the same time as the Longfellow, will be at the milk stage and the Longfellow glazing and ready to cut. But when you sow the seed separately, you can go to work and cut the Longfellow, and then ten days later you can cut the Leaming. I sow ten acres of Longfellow, ten acres of White Cap Yellow Dent, ten acres of Leaming and ten acres of Mastodon. If you are only going to sow ten acres altogether, you can put in two acres of each variety.

Q.—Do you sow the whole field at the same time?

A.—Yes, I would start sowing the big variety first. I will now take up two or three reasons for failures. The first is sowing too closely together, the second is sowing unsuitable varieties, and the third is poor preparation of the seed bed, or selecting unsuitable fields in which to sow the corn.

I have said I do not care what kind of soil it is, because I have seen magnificent crops of corn on every kind of soil you can imagine, from the heaviest clay down to the lightest blowing sand, and even the blackest kind of black muck, two and three feet deep. I have seen splendid crops of corn growing under all these conditions.

You must give the right cultivation. I have seen corn growing after all other kinds of crops, but the best crop to follow after corn is pasture. Clover sod is just as good, but pastured clover sod is the best of all. We have fifteen acres of land that we pasture every year. It is a mixture of clover and alfalfa. We pasture it one year, and then sow corn on it, and we have never failed to have a magnificent crop of corn from that field. Then we have six acres where we grow clover one year and the next year corn, and then we have about thirty acres on which we grow hay every second year, and then grow corn, and we always secure a good crop from that. But where we grow corn after stubble, unless we have grown clover at the same time as the grain, we have very unsatisfactory results. Therefore, I say, the best place in the rotation is after pasture or after clover hay. If you cannot do that, then put the corn in after hay.

Apply the manure during the fall, winter or spring, to suit your own convenience, but do not fail to get it on. Plow it under, but do not plow it in deep: say four inches, or not more than four and a half at the very most—just as shallow as you can plow it, consistent with the kind of soil you are plowing. The plowing should be done in moist weather; but of course we cannot control the rain, and we have to do the best we can. After the land is plowed, it should be rolled, and that is a very important point, and that is where 85 per cent. of our farmers fall short. They get a nice surface on the land by using the disc harrow, and they think it is all ready, but it is not. A sod that is plowed and manured for corn, must be packed right down solid, and the only way to do that is by repeated disc harrowing and rolling, or by using a soil packer. There are not many soil packers in use in Eastern Ontario, but if you are growing corn extensively I believe it will pay you to get one. I have had one for only two years, and I am not prepared to say that it will pay a farmer to get one. Roll the land first, then disc harrow it twice, once lengthwise and angling, and then roll again and then disc harrow, angling the other way. It may take four or five disc harrowings and a couple of rollings to get the field right. I have heard some men say to get the land ready and get the corn in and work it down afterwards, but that will not do. You must work the land down before you put the corn in, or else you will have an unsatisfactory crop.

What is a perfect condition for the land? If you put the manure on the surface of the soil and then turn it under air spaces are created. You all know that when you are plowing, no matter how flat you try to plow, one furrow will get on top of another and leave an air space. To overcome that you must use the roller, and after you have rolled the land and disc harrowed it it is 50 per cent. better worked than if you did not roll it. You know how a furrow, lying loose, will dodge the disc harrow more or less; but if you roll the land it has to settle down tight and cannot dodge the harrow. I have tried it over and over again, and I know what I am speaking about. After you have disc harrowed it twice, roll it again, and repeat it three times if necessary. You should not do any sod less than twice. Have the land in thorough shape, so far as you can get it; and you can tell that when you are driving your team across if you watch them, and do not see the off foot sink in more than the nigh foot, and if the horses walk along evenly, no one horse sinking more than another, or no one foot sinking more than another in any place. Have every intricacy beneath that soil solid: get the seed bed just as firm and hard as you

can make it. Some one may say why don't you just rip it up with a spring tooth cultivator? That would be an ideal condition, but you could not get the manure in.

Q.—Do you plow the sod in the fall or spring?

A.—I prefer the spring, but I have no objection to the plowing being done in the fall, provided it is convenient; but I think you get better results from spring plowing.

Q.—What about the manure if you plow in the fall?

A.—You can put it on the surface; but you must be careful not to have it too strawy, because if you do it will make a lot of bother when you are working with the harrow. We are compelled to use more straw at the Experimental Farm than the average farmer and we have some difficulty in getting it worked into the soil, especially if we do not plow it in.

Q.—Do you cut the straw?

A.—If we cut the straw, it is all right. After you get the soil worked down firm, you should then give it a harrowing or two and then roll it before seeding. Now, some of you may say, "It is little wonder we do not grow corn when you look at all the work." It is all horse work, and it will pay you to do this work the first year you grow corn, and the year after, and the year after that. The treatment you give the corn crop while it is growing, and while you are getting ready for it, is the treatment that makes for success for three or four successive years. It is the great amount of man handling—or horse handling—that your field gets in its rotation of from three to five years that makes for the success of your farm operations right through the rotation. The farmer who neglects the proper preparation of his soil, the proper handling of his soil, is not farming properly. The year to give it the proper handling is when you are growing the corn. I have no hesitation in saying that.

After you have sown the crop, if the weather is a little cold and unsuitable—not just as nice as it might be,—give it a harrowing four or five days after it has been sown. It will not disturb the seed, and it will open up the soil and make it mulch out. If you leave it untouched, the evaporation from that surface is so great that the soil is kept cold. Corn is a semi-tropical plant, and likes lots of heat. When it is ninety-five in the shade and you wish a little breeze would spring up or that you could have a little January weather, that is the time when the corn smiles. It is not the presence of the moisture that makes the soil cold; but if you allow that soil to lie there undisturbed, crust forms and evaporation is going on very rapidly, and your soil will be cold. By running the harrow over it and making a mulch you will prevent evaporation, the water will gradually sink down, and your soil will be several degrees warmer, and any weed seeds near the surface that will have germinated, will have been destroyed.

Q.—Do you roll the land after seeding?

A.—If the land is very loose. Sometimes you should roll, and sometimes you should not, and that is where the skilful farmer comes in. It is not always wise to roll or harrow; you must know something about farming in order to know what to do. A great many farmers will say: "Of course, roll or harrow," without thinking of what will be the effect. We must think a little. I am very pleased that these different Agricultural Schools which are being established throughout this Province of Ontario—you have one in this town of Perth, another in Morrisburg and in fourteen different counties—give such splendid lectures. If you study the principles and the treatment of soil, you will do more to improve your farming methods than anything else you could do. If you cannot attend the courses yourself,

send your sons or your neighbor. The average farmer does not know why he rolls, and what the effect the rolling has, and it is the same with harrowing. You should know why you do all these things.

After the corn is up from two to eight inches, you might get a cold rain or have some unfavorable condition, and if so, you should harrow it again. The chances are the harrow won't tear out much of the corn. The slanting tooth harrow might be useful at that stage, but in my opinion it is just as well to use the straight tooth harrow, because the slanting tooth puts the face of the harrow too close to the ground and the bars sometimes do damage. If you use a straight tooth harrow, it is only once in a while that it will hit a plant.

Q.—What depth would you advise planting the seed?

A.—That must be controlled by the soil. If you are sowing in fairly dry weather, in a good light soil, you might go as deep as three inches, and if you are sowing in a heavy soil, that is not too dry, if you get it down an inch you are doing splendidly. It varies according to the soil. You want to get the corn down to the moisture, and have enough soil on top to protect it from the sun. So many things you do are controlled by the peculiarities of the soil and the season that one cannot lay down a general rule. You should give the plant plenty of room to grow and keep the surrounding soil clean. Let it have a good solid seed bed, and see that it gets some moisture and that it gets that moisture from below, and prevent evaporation. These are the great principles in corn growing.

After you have harrowed, get your cultivator going as soon as you can, especially if it is dry weather. The more frequently you cultivate in dry weather, the greater are your chances of success. In Eastern Canada we think we are in a zone where there is never any trouble about moisture; but I venture to say there is not a farmer in this room to-day who has not had some difficulty every year, and would like to have a little more rain, especially if he grows forage crops. We can make rain to a certain extent by proper cultivation, and that is one of the principal reasons for this extensive cultivation. It is the best provision against lack of rain that one can have. If you knew you could give that corn field half an inch or one inch of rain whenever you took the notion, then it would not be necessary to work that land so much; but you do not know anything about that. Therefore, you must get your rain ready, get the moisture ready, and make provision against a drouth, and then keep it up right through. You must provide against drouths from the middle of May to the last day of August, and after that the corn can look after itself.

Mr. Dargavel: What about the depth of cultivation?

Mr. Grisdale: Of course, when you are harrowing corn land, after it is sown, you should not go very deep. Just let your harrow track over lightly, but when you start to cultivate between the rows you can put on a little power, because the soil is not occupied by the roots, and no harm is being done. As you get further on in the season, you should make it a little shallower. The more frequently you go over it, the harder the soil gets: and each time the cultivator tooth will be a little higher up. When it gets near the end of the season, you cannot go down very deep unless you put on pressure, and I do not worry myself about that question because I know a man cannot go very far wrong.

Q.—Don't you think the cultivator teeth are too narrow and leave too many ridges in the field?

A.—There are such a variety of teeth. If you are cultivating for moisture conservation, you should use a spiked tooth. You get three sets of teeth with the

new cultivator. The duck foot, the two and a half inch and the spiked. If you are growing roots, this two row cultivator gives you a tremendous advantage, because you can use it right through the whole root crop, and right up to the end of the year.

I want to say a word or two about harvesting, and to advise you not to be in a rush to get the corn into the silo. I do not mean that you should postpone it until the middle of November or October, but do not try to get it in before the grain is well formed. A little frost will not do much harm. I have seen the leaves turn white and yet have a first class brand of ensilage. Do not think that because a few leaves are white you have lost half your crop. It is better to have the corn go in with a few white leaves than to have it go in with no ears worth mentioning. Let it stand until the latter part of September.

Q.—Will the maturing of the corn overbalance the fact of the leaves being frozen?

A.—Yes, the leaves are not lost; there is a slight chemical change, but very much less loss than there would be from putting the corn in too early.

Cut the corn in short lengths. Do not think you gain any advantage by cutting it three-quarters of an inch. Cut into half-inch lengths, and a little shorter is better still. The shorter the ensilage is cut, the more easily it may be assimilated, and the better it will keep.

Fill your silo properly; keep it well filled around the outside all the time, and keep it well packed. The centre of the silo will look after itself. I am almost constantly in receipt of letters from farmers saying that they do not think much of cement silos or steel silos, because the corn for a few inches in becomes dried out or in bad shape. That is not the fault of the silo, that is the fault of the man who filled it. You should put a good man in the silo. You cannot see him in there, and he may take his off leg and land it against one side, and lean up against the other side, himself. He may get up once in a while and give it a kick here and there, but that is not what you want. If you have a real good man whom you know is faithful, put him in the silo and say to him: "Now, John, keep this banked up against this wall and that wall," and if you have any walking to do, keep walking around the outside all the time and keep it five or six or seven or eight inches higher than it is in the middle.

Now, then, your silo is full. Fill it up a little higher in the centre and tramp it down, and if convenient, put a few pails of water on it. Do not put anything else on it, tramp it well and then go up about three days after and level and tramp it again. You will lose only three or four inches at the most. Keep the middle a foot higher than the edge of the silo and do not let your man go in and grab the first forkful and take it out. Make him keep it lower at the outside and you will never have any spoiled ensilage on the outside, and you will have very little freezing if you keep it a foot lower next to the silo than it is in the centre. Do not imagine that because it freezes a little, it is lost. It does not hurt it at all provided you thaw it out before you feed it. You should not feed ensilage while frozen, because there is more or less danger of gas forming.

As to the cost: It will cost you to grow a ton of hay from $5 to $6 in a good year, and in a poor year from $7 to $8. It will cost you to grow a ton of ensilage, if you grow it under fairly good conditions, taking the average of twelve years, and not considering the rent of the land, about $1,25 a ton. A ton of hay is worth from 2 to 2½ tons of ensilage in food value. I say that reluctantly, because I do not believe it is worth that much. The nutritive element, the dry matter, is not the exact measure of the value of a ton of ensilage; it is the succulency. The palata-

bility and acceptability to the animals is worth a very great deal. You know yourself that if you get a dish that you like very much, you are apt to eat considerably more of it than if you get a dish that is not so palatable, and it is the same way with the animals. While it may sound peculiar to say that you ought to feed an animal in such a way as to persuade her to eat more than she otherwise would, yet I think it is the best thing you can do. You should so feed an animal that she wants to eat more. That will result in having your animal in good condition. Therefore, I think I am safe in saying a ton of hay is not worth more than two tons of ensilage, and you can grow for $2.50 on the corn field just as much food as you can grow for $5 or $6 on any other field you like to mention on your farm. And that is not all; because, if you grow a crop of corn properly, you will grow two tons of hay on that land where you only grew one and a quarter tons before when the time comes for the hay crop again. It is not only that you grow the corn very cheaply, but you grow other things more cheaply. The corn crop is a soil saver and will improve the land. It is the salvation of agriculture, and will be the salvation of agriculture in Eastern Ontario. There is no crop that can be mentioned that can be so cheaply and easily and conveniently and certainly cultivated as corn—no failure, no great expense, no material labor, no extra help required. Everything is in favor of increasing the production of corn.

Q.—What about the crows?

A.—Our farm is probably a little too near the city to say the crows are any bother, but I know that they are farther out in the country. Last year, I had a farm of my own about ten miles from Ottawa, and we had some trouble with the crows. My brother, who managed it, wrote and said, "What will I do?" I sent him down one ounce of sulphate of strychnine and told him what to do with it. He took one tablespoon of it, put it in a gallon of water, and then filled the receptacle with corn, putting the corn in until the water and corn were about the same level and he kept it warm all night. He heated it up thoroughly for a while, and then let it soak all night. The next day he scattered that corn all over the corn field, and so did his neighbor who had a corn field right across the road, and that day and the day after there was deadly destruction among the crows, and they were not bothered any more that season That is the most effective way I know of, but it will kill hens just the same as it will crows. It has such a deadly effect on the crows that they have never been bothered with them since; no doubt it killed thousands.

We have a two-hundred acre farm. Twenty-five years ago we started growing between seven and eight acres of corn, and to-day we grow fifty acres a year. What has been the result? Twenty-five years ago, we started out with twenty-five head of cattle; in fact, twelve years ago, when I went on the Experimental Farm, we had only forty head. I bought a few more steers, and we had about fifty head for awhile; but to-day we have 180 head of cattle on the farm, over fifty sheep, twenty horses and two hundred pigs, and we do not buy any hay, straw or rough food. We buy a little straw for bedding, because we cannot produce all the bedding that is required to bed them in the way we like it done. We do not buy any commercial fertilizers, and we produce an enormous amount of barn manure, something like 1,200 or 1,500 tons every year. We, of course, give part of that away to the other divisions of the farm, but we get all the manure that we want for our fields. Our corn crop averaged six or eight tons to the acre. We supplemented the corn with clover hay. We grow about fifty acres of hay every year, and we expect it to give us 200 tons. This year we had 225 tons; but we expect

to get four tons to the acre and we almost always get it. We supplement that mixture of corn ensilage and straw with bran, gluten and oil cake meal and a little oats. I do not know anything that will beat that combination; bran as a basis, 600 pounds, oats about 100 pounds, gluten meal about 200 pounds, and oil meal 100 pounds. If you cannot conveniently get both gluten meal and oil cake meal, one will take the place of the other. I would not advise your trying to put quite as much oil cake as you would gluten meal. If you cannot get the gluten meal put in a couple of hundred oil cake with the bran and oats, and, if you cannot afford the oil cake, put in ground oats. It is a rather expensive feed, and the only excuse for feeding oats with bran or shorts is that it is the most palatable food you can give. There is no meal food that will be so acceptable under all conditions to the cow as a little ground oats. I have seen what might be considered a very poor ration giving good results, provided it contained a fair supply of oats. If you want to make it exceptionally palatable, put a little water on it just before feeding. We do not recommend farmers to wet the food for the cows; but if you want to make a cow eat a lot more meal than she otherwise would, there is no more sure way of doing it than adding ground oats to the ration and putting water on it. She will eat 25 per cent. more than if you gave it to her dry.

Q.—What does the gluten meal cost you?

A.—$31 or $32. Do not confound gluten meal with gluten feed. Gluten feed is a manufactured food, and you cannot get nearly as good results from gluten feed as from gluten meal. Gluten meal usually contains 33% to 35% protein and gluten feed from 18% to 20%. The Edwardsburg Starch Factory buy the corn, wash out the starch and treat it, and they have various products that they combine and make gluten meal. They add other combinations to that and make gluten feed; and then they make oil cake meal, corn bran, and so on. These are the by-products of starch factories, of which the best is gluten meal.

Q.—Do you put the meal right on the ensilage?

A.—Yes; take a layer of ensilage and scatter on top of it, and cut all straw, and then another layer; and if you have roots, you can put them in there.

Q.—How much gluten would you put to 600 pounds of bran and 100 of oats?

A.—If you have no oil cake meal, 200 or 250 pounds. Oil cake meal is rather better than gluten. The cow likes variety, and a mixed meal made of seven or eight kinds is much more acceptable to the average cow than a meal of practically a similar combination, but made of only one or two meals.

Alfalfa is one of the best things you can grow, but you can grow it only after years of work. I would not advise any farmer to undertake to grow a very large amount of alfalfa until he has learned how to grow it on a little field. Start on a nicely cultivated, well drained part of your farm, and grow half an acre, and then gradually spread out until you get it all over your farm. We grow it as a regular crop. It is our best hay crop, but it was hard to get it started.

Mr. Dargavel: How do you recommend getting the corn seed; in the ear or shelled?

Mr. Grisdale: That is a difficult question. I have tried both ways and I have been satisfied both ways, and I have been disappointed both ways. You receive a sample from one of these growers and you order 30 bushels, and you find it does not pan out. I do not like to knock any farmers, but unless the farmers in the west who are catering to the corn growers in the east waken up and do better, they cannot build up a trade.

Mr. Dargavel: They are making a big push for it.

MR. GRISDALE: If they intend making a big push for it, they must send us seed that is up to the sample. You would think they would make a point of sending to the Experimental Farm a real good sample.

Q.—Did you place the order directly after the sample came?

A.—Yes.

Q.—There was no chance of deterioration in the meantime?

A.—The sample came on Monday, and we had it tested by Saturday, and the order sent in by the next Monday.

Q.—That is the first complaint I have heard of the Western Corn Growers. At Guelph they spoke very highly of them.

MR. GRISDALE: If you had been among the farmers in the East you would not have heard it spoken so highly of. I know that south of us last year they had a great deal of bother. The corn that you buy shelled may be that way too, but you come back at the seedsmen. I believe it is best to get the seed on the ear. The corn crop is harvested when it is not quite ripe, or something goes wrong, and they neglect to ripen it up. Or they neglect to dry it properly after it is harvested.

THE CHAIRMAN: We are delighted with Mr. Grisdale's address. It is the kind of talk that we like. He has given you the experience that he has had in growing this very corn. It is the wonder of the age that Eastern Ontario does not go into this matter more thoroughly. I am surprised that more farmers in Eastern Ontario do not grow more of this cheap fodder. It is one of the best foods we have for the production of cheap milk.

Q.—What is the difference between the feeding value of the corn that is left out in the field and that that is put in the silo?

MR. GRISDALE: That is a very hard question to answer. When you leave it out in the field it loses 25 per cent of moisture in a very short time. I would say that when you first cut it, it is worth 100. If you put it in the silo it is worth 85 per cent., and if you leave it in the field in shocks it is worth 50 per cent. That is the result of experience all over Canada and the United States.

The convention then adjourned.

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

ANNUAL MEETING.

The Forty-fourth Annual Convention of the Dairymen's Association of Western Ontario was held in the City Hall, Stratford, on Wednesday and Thursday, January 11th and 12th, 1911. There was a large attendance at the opening session and throughout the entire convention.

The President, Mr. JOHN H. SCOTT, of Exeter, occupied the chair through all the sessions.

The cheese exhibit was one of the best ever held in the Province, its appearance being so good that Mr. J. A. Ruddick, Dairy Commissioner at Ottawa, purchased the entire lot of cheese for the purpose of sending to London, England, to be used as a special cheese exhibit at the Empire Exhibition to be held there during the present year.

PRESIDENT'S ADDRESS.

JOHN H. SCOTT, EXETER.

It affords me a great deal of pleasure this morning to welcome you to the Forty-fourth Annual Convention of the Dairymen's Association of Western Ontario.

I am very pleased to welcome you for many reasons: First because you have honored me by making me your President for 1910. I appreciate very much what the dairymen did for me last year. The only regret I have is that I have not been able to do more for the dairymen. When one gets into this work he begins to realize the necessity for more work being done. I have often thought that the average dairyman throughout the country does not realize what the Dairymen's Association has done in the past, and what there is to do in the future.

I am pleased to welcome you here because it is the county town of my home county. I was born, raised, and educated near the City of Stratford, and it is a pleasure for me to welcome you here to this classic city in the County of Perth; and I would like to remind you that we are in the centre of a dairy section. From point of quality, Perth County stands first in the Province—and in the world—in the matter of cheese production. I do not say anything about the quantity, because there are sections that perhaps will beat Perth for quantity; but for fine quality I do not think it could be excelled. There has been more prize money won in Perth County than any other county in the Province.

I am pleased to welcome you to Stratford for a historic reason. Away back forty-four years ago the Dairymen's Association was first organized, and one of the corner-stones of that Association was a resident of Stratford, and those who knew him are proud to say that they are acquainted with the Hon. Thomas Ballantyne, and we are proud to come back to Stratford, the home of such a man as Mr. Ballantyne.

It is six years since the Convention last met here, and wonderful developments have taken place along dairy lines since then. When we look back over the history of the Association since that time, and see the changes that have taken

place and the progress that has been made, we know that the dairymen are not asleep and that they have been working hard. The Acts of Parliament that have been passed by our Government are also signs of advancement in dairy business.

But yet we must not stop. We have not arrived at the point where we can say we have reached perfection by any means. One danger confronts us that never did before, especially in the production of butter, and that is our home market. Times have changed as regards the butter market. Years ago we were sending large quantities of butter to Great Britain, but now our exports are practically cut off. Our exports during the present year were 12,000 boxes less, during the period of navigation, than in 1909. That does not say that we are making less butter, because the receipts at Montreal from the first of May to the second of December were 42,744 boxes more butter than in 1909, and that indicates that we have a very large and growing home trade, and that it is increasing year by year. Thousands of people are coming into the country and going to the West and to the construction camps on the railway and to the mining camps in New Ontario; they are consuming our butter and not producing, so that the home market for butter is bound to increase, and the production of butter must increase.

Some of the speakers at the Eastern Convention predicted that cheese would lose pre-eminence amongst our dairy products, and it looks like that to me. I do not say that because I am in the creamery business, but from observation that I have made. We found that the butter business is gradually encroaching on the cheese territory. Perhaps it is a good thing that we have this growing market for butter, and we should turn our attention to butter where we can profitably do so.

The production of cheese for the year 1910 was very good. The export of cheese from Montreal, during the period of navigation showed an increase over 1909 of 25,995 boxes. The receipts at Montreal of cheese made from May first to December second showed an increase of 25,038 boxes, and that shows that the cheese business for 1910 has been prosperous, notwithstanding the fact that a great many people say that the dairy business is on the decline. These figures continue to prove that it is not on the decline, and that we are making more butter and cheese to-day than ever before. We are also making better quality than we ever were before; so notwithstanding the fact that some say the dairy business is on the decline we have facts to prove the very opposite.

What is to be the future of the dairy business in Western Ontario? That is a question that we must consider, because we have an increasing home market, and the strongest competition we have is our own competition; and when we come into competition in our own market with neighboring factories then the best goods will receive the highest prices. We are in the presence of the strongest competition that we can ever have, and I do not think there ever was a time when it was more necessary for us to put forth every effort to look after the quality of dairy products than at the present time. The better goods we make the more the people will consume. Those of us who are in the butter business know that if we sell butter that is not up to the mark it is not consumed very rapidly, and the customer does not come back for another shipment in a hurry; but if you sell goods that are right up to the mark and of a first-class quality, you will soon receive an order for more. We ought to keep the quality, no matter whether it is for the home market or the export market.

Another point that has been forcing itself upon us during the past two years, has been the export of cream to the United States, which has reduced the making of butter considerably. It was estimated that at the very least calculation there

was a million gallons of cream shipped across the line in 1910, and that means about 25,000 boxes of butter taken out of our market. Whether that will continue or not I am not prepared to say, but there is that growing demand in the market for first-class goods that we cannot neglect, and it will be a factor in the dairy business of the future, and it is worth attention.

DIRECTORS' REPORT.

The following report was read by Mr. Frank Herns:

Your Directors are pleased to report that throughout Western Ontario the season just closed has been prosperous. The work of your Association, we believe, has been appeciated, and progress has been made in the different branches of work connected with dairying.

Prices of Dairy Products.

Cheese.—The prices for cheese, although uniform for the season, were not as high as many expected; but, on the other hand, with good pastures, abundance of winter feed, a heavy flow of milk, with a greater yield from the individual cow, the season should be profitable for the producer.

Butter.—Prices for butter have been nearly as good as last year, and even with a large increase in make the market seems able to absorb the output. A greater increase in the butter industry is predicted. The home consumption is growing rapidly, and with a possible increase in the shipments of cream to the United States prospects are bright for the creamery. Our home consumption of milk, cream, butter, and cheese is the great factor in decreasing our exports, but the total output of dairy products is becoming greater each year.

Membership.

Your Association has this year a membership of 316. We trust this will be increased in 1911. Subscription to *Farm and Dairy* for one year is included in the membership fee of $1.

Quality.

Quality must be maintained whether our dairy products are exported or consumed in Canada, and we feel that every effort should be put forth to improve the quality of our cheese and butter. Other countries are rapidly increasing production and taking advantage of every opportunity to improve the quality and impress upon the minds of consumers the advantages in buying a superior article, and it is absolutely necessary that we be continually on the alert that the quality of the Canadian cheese may continue to hold first place, that we may hold our superior position, not only for the excellent reputation of our products, but as the largest cheese exporting country.

Director Canadian National.

We are pleased to report that a dairyman with the reputation such as that of W. W. Ballantyne was last year appointed a Director on the Board of the Canadian National Exhibition. We trust he will again be elected at the coming Annual Meeting, as we are satisfied that no better representative can be secured to look after the dairy interests at this great National Fair. We beg to express our appreciation of the excellent manner in which this dairy exhibition was conducted.

Cold Storage at London Fair.

Your Directors, as representatives of your Association, wish to acknowledge the enterprise shown by the Directors of the London Fair Board in placing at the disposal of dairymen such excellent cold storage for the exhibition of cheese and butter. Both the Toronto and London Exhibitions are excellent places in which to advertise Western Ontario cheese and butter, and we think the dairy department of these two Exhibitions should be encouraged and strongly supported by placing large and attractive entries of both cheese and butter each year on exhibition.

Dairy Farms Competition.

Your Directors have reason to believe that the dairy farms competition conducted by *Farm and Dairy* has been a means of bringing about good results. We express our thanks to those who contributed towards this competition.

Special Officer.

The employment of a special officer to deal with cases of deterioration of milk was continued this year, and have reason to believe this system is dealing effectively with this difficulty. Since in 1907, when sixty cases were prosecuted, only twenty-seven cases were handled in 1910. Your Directors respectfully recommend the incoming Board of Directors to continue this system. The Association is this year in debt to this work $156.50.

Legislative Committee.

The Committee appointed by your Directors to act in conjunction with the Committee appointed by the Eastern Ontario Dairy Association, with respect to dairy legislation, met when requested and offered suggestions regarding important points. We as dairymen wish to express our appreciation of the Act lately passed at the last session of Parliament by the Federal Government dealing with glassware to be used for the Babcock test. This should effectively eliminate all complaints in the future in connection with the readings of tests, so far as inaccurate glassware is concerned.

Dairy Herd Competition.

Your Directors decided to continue the Dairy Herd Competition, and thought it well to make some changes in the manner of awarding the prizes. The prizes, although decreased in amount, allow two classes for patrons sending to cheese and butter factories. The change was made to meet the objections of the owners of large herds, who claimed they had not previously been on the same basis as the smaller herds. It is considered more difficult to get individual cows of a large herd to produce an average amount equal to those of a smaller herd. This seems to be borne out by results, as the first prize winner in the creamery class in Section 2 would only have been second under last year's rules, and the winner in cheese factory patrons in Section 2 would have been only fifth. The entries this year are up to the average, and we note with satisfaction that the winner has raised the standard for the amount per cow over previous years. We believe this competition is doing a great deal of good, as the wide publicity given through the agricultural and other papers tends to stimulate patrons to endeavor to accomplish as much or more in the way of production than those who entered in this competition. We would respectfully suggest that the Department of Agriculture

grant our Association some increased funds that the prizes for this competition may be increased. We express thanks to Ryrie Bros. for the donation of silver and bronze medals.

Dairy Exhibition.

Your Directors continued the Dairy Exhibition, and wish to thank all those who contributed special prizes. This Exhibition is becoming more popular each year, and should receive the support of all cheese and butter makers, as it is an excellent way in which to advertise the good qualities of Western Ontario cheese and butter. We feel sure that this exhibition has been in the past a great help in improving the quality and finish of our cheese.

A class for Stiltons was put in the prize list, and we beg to acknowledge the interest taken by Mr. C. C. James, Deputy Minister of Agriculture, and also his contribution of a special prize of $10. We trust this class will become more popular from year to year, as the sale of ten-pound Canadian Stilton should rapidly increase as our consumers find out through advertising in this and other ways that such sized cheese can be obtained.

Factory Improvements.

The cheese factories and creameries have, in our opinion, made a special effort during the past year to improve their sanitary conditions, and are as rapidly as funds will permit putting their factories and equipment in better condition.

Instruction Work.

The work of instruction carried out through your Association in conjunction with the Ontario Department of Agriculture is resulting in gradual improvement, in the raw material as well as our finished dairy products. A full report will be submitted by the Chief Instructor.

Makers' Certificates.

Before the season of 1911 opens all factory operators will have taken out certificates granted by the Ontario Department of Agriculture. This we consider a move in the right direction, and should in the future have the effect of bringing into the dairy business men of known ability, and should have an uplifting effect on the industry as a whole.

Speakers for Annual Meetings.

The Department of Agriculture very kindly paid the services of speakers to annual meetings, the Associations paying their travelling expenses. This we consider exceptionally good work, and will be continued.

Board Meetings.

Your Directors met at the several board meetings and transacted the business of your Association to the best of their ability, and we wish to express our appreciation of the kindly feeling and agreeable way in which the work has been carried out this year. We wish also to express sincere appreciation of the interest taken by the Ontario Department of Agriculture in the dairy industry of this Province, and the willingness shown at all times to come to the aid of the dairymen and do everything possible through grants of money, legislation, and education to build up the industry, placing it on a solid basis, and endeavoring to make the Province of Ontario the foremost dairy Province of the Dominion, and to keep the quality of Ontario cheese and butter second to none.

Financial Statement.

The financial statement was read by Mr. Frank Herns, and upon motion of Mr. Parsons, seconded by Mr. Paget, it was adopted.

Dairy Herd Competition, 1910.

Mr. Frank Herns read the following report: The Herd Competition was continued, the Association donating $100 in cash prizes, and Ryrie Bros. sweepstakes, silver and bronze medals. Your Directors are convinced this is good work, and the results of previous years have been a means of creating a greater interest among the patrons in the increased production of milk and butter fat per cow. The prize list was arranged for two sections in each class. The changes made are intended to place large and small herds on a more even basis. It is considered more difficult to get individuals of a large herd to produce equal average amounts with those of smaller herds. A note of interest is, the winners have raised the standard for the amount per cow over previous years.

Two Diamond Hall Medals (enclosed in handsome cases), donated by Ryrie Bros., Toronto.

$100.00 in cash prizes, donated by the Dairymen's Association of Western Ontario

Class 1.—For Patrons of Cheese Factories.

Sec. 1.—To the patrons who furnish the 1st, 2nd, 3rd and 4th largest amounts of milk per cow to any cheese factory in Western Ontario from May 1st to Oct. 31st, 1910. From herds of 8 to 14 cows (inclusive). 1st, $10.00; 2nd, $7.00; 3rd, $5.00; 4th, $3.00.

Sec. 2.—To the patrons who furnish the 1st, 2nd, 3rd and 4th largest amounts of milk per cow to any cheese factory in Western Ontario, from May 1st to Oct. 1st, 1910. From herds of 15 cows or over. 1st, $10.00; 2nd, $7.00; 3rd, $5.00; 4th, $3.00.

Class 2.—For Patrons of Creameries.

Sec. 1.—To the patrons who furnish the 1st, 2nd, 3rd and 4th largest amounts of butter-fat per cow to any creamery in Western Ontario, from May 1st to Oct. 31st, 1910. From herds of 8 to 14 cows (inclusive). 1st, $10.00; 2nd, $7.00; 3rd, $5.00; 4th, $3.00.

Sec. 2.—To the patrons who furnish the 1st, 2nd, 3rd and 4th largest amounts of butter-fat per cow to any creamery in Western Ontario, from May 1st to Oct. 31st, 1910. From herds of 15 cows or over. 1st, $10.00; 2nd, $7.00; 3rd, $5.00; 4th, $3.00.

Special Sweepstakes Medals.

A Silver Medal (value $10.00) to the patron who furnishes the largest amount of milk per cow in cheese factory contest.

A Bronze Medal (value $10.00) to the patron who furnishes the largest amount of butter-fat per cow in creamery contest.

Rules of Dairy Herd Competition.

1st. No herd of fewer than eight cows will be allowed to compete.

2nd. Figures must be taken from the cheese factory or creamery books, and the number of cows and the total and average amounts of milk or butter-fat must be certified to by the cheese or butter maker, and the secretary of the cheese factory or creamery.

3rd. The average amount of milk or butter-fat per cow must be calculated on the basis of the total number of cows from which milk or cream is sent to the factory during the season of six months, May 1st to October 31st, 1910.

4th. No substitution of one cow for another will be allowed.

Note.

Example 1.—If the patron begins to send milk or cream to the factory on 1st of May from say eight cows and continues to send to the 31st of October from the same herd he is eligible. Larger herds the same.

Example 2.—If the patron begins to send milk or cream to the factory on 1st of May with say only seven cows in milk, and in June, or at any other time, another cow freshens, and in July, or at any other time, another cow freshens, making in all nine

cows, the patron is not barred from competing, provided the total number of cows (9) is used for dividing the total milk or butter-fat to find the average amount of milk or butter-fat per cow for season. Larger herds the same.

Example 3.—If the patron begins to send milk or cream to the factory on May 1st, with say eight cows, and in June or any other time in the season, for some cause, one cow drops out of the herd, the patron is not barred from competing, provided the total number of cows (8) is used for dividing the total milk or butter-fat to find average amount of milk or butter-fat per cow for season. Larger herds the same.

Example 4.—If the patron begins to send milk or cream to the factory on May 1st with say eight cows in the herd, and some time during the season, for some cause, one or more cows drop out of the herd, the patron will not be allowed to substitute a new milch or any other cow in order to keep up the milk from the herd. Larger herds the same.

Cheese Factory Patrons.

Class 1, *Sec.* 1.—1st. Jno. VanSlyke, Silverside, Dunboyne, 100 acres in farm, 10 Holstein grade cows, 75.426 total lbs. of milk, 7,542 lbs. of milk per cow, 754.26 lbs. of milk produced per acre.

2nd. Seymour Cuthbert, Sweaburg, 75 acres in farm, 14 Holstein grade cows, 103,871 total lbs. of milk, 7,419 lbs. of milk per cow, 1,385 lbs. of milk produced per acre.

3rd. Jno. W. Cornish, Sprucedale Farm, Harrietsville, 50 acres in farm, 10 Holstein grade cows, 70,629 total lbs. of milk, 7,062 lbs. milk per cow, 1,412.5 lbs. of milk produced per acre.

4th. Wm. W. Bartley, Poplar Grange, Belmont, 50 acres in farm, 5 Holstein and 3 grade Durhams, 51,775 total lbs. of milk, 6,472 lbs. of milk per cow,, 1,035.5 lbs. of milk produced per acre.

5th. Isaac Askin, Fairview, Carthage, 100 acres in farm, 12 Holstein cows, 62,972 total lbs. of milk, 5,247 lbs. of milk per cow, 629.72 lbs. of milk produced per acre.

Class 1, *Sec.* 2.—1st. W. G. Pearson, West View, Holbrook, 100 acres in farm, 20 Holstein and Holstein grade cows, 122,570 total lbs. of milk, 6,128 lbs. milk per cow, 1,225.7 lbs. of milk produced per acre.

Creamery Patrons.

Class 2, *Sec.* 1.—1st. R. M. Bowie, Maple Lane, Beachville, 50 acres in farm, 11 Holstein grade cows, 2,479.8 total lbs. of butter-fat, 225.4 lbs. of butter-fat per cow, 49.6 lbs. of butter-fat produced per acre.

2nd. Geo. Bourchier, Echo Farm, Plattsville, 25 acres in farm, 8 Jersey grade cows, 1,218.5 total lbs. of butter-fat, 152.3 lbs. of butter-fat per cow, 48.7 lbs. of butter-fat produced per acre.

3rd. C. Johann, Fairview Farm, Belmore, 200 acres in farm, 9 Holstein grade cows, 1,341 total lbs. of butter-fat, 149 lbs. of butter-fat per cow, 6.7 lbs. of butter-fat produced per acre.

Class 2, *Sec.* 2.—1st. E. W. Lick, Beachville, 250 acres in farm, 16 Holstein grade cows, 3,279.6 total lbs. of butter-fat, 204.97 lbs. of butter fat per cow, 13.1 lbs. of butter-fat produced per acre.

2nd. Wm. Hutchison, Pleasant Grove, Princeton, 200 acres in farm, 21 Shorthorn cows, 3,503 total lbs. of butter-fat, 166.8 lbs. of butter-fat per cow, 17.5 lbs. of butter-fat produced per acre.

3rd. Courtney Carr, Ingleside, Beachville, 100 acres in farm, 22 Ayrshire and Jersey grade cows, 3,238.5 total lbs. of butter-fat, 147.2 lbs. of butter-fat per cow, 32.38 lbs. of butter-fat produced per acre.

Sweepstakes Medals.

Jno. VanSlyke, Dunboyne.
R. M. Bowie, Beachville.

FEEDING AND HANDLING WINNING HERDS.

Jno. Van Slyke, Dunboyne: I am greatly pleased to receive first prize in the competition, and will try and give you some idea as to the management of the herd.

The foundation consisted of grade Durhams, selected individually for milking strain. These were crossed with a pure-bred Holstein sire. The heifer calves were raised and form the present herd.

About a week before they freshen I feed a few mangels, three pints chopped oats, and a little flaxseed meal, in addition to the rough feed. This, with the exception of a little oat chop, is dropped as soon as good grass comes. When pasture becomes short they are fed sweet corn twice a day, all they will eat, until the corn stalks are too ripe. Then they are fed mangels and a little flaxseed meal until we stop sending to the factory.

Chop consumed in six months, 5,051 pounds, which is scarcely 2¾ pounds per cow per day, everything being raised on the farm.

W. G. Pearson, Holbrook: Our farm consists of 100 acres, all high, dry land. We raise each year from 15 to 20 acres of wheat, 15 of oats, 20 of corn and roots, 20 acres in meadow, and 20 in pasture land. Corn for silo is some of Dent varieties, which is chiefly for summer feed. We raise the Flint for winter feeding. Have it well eared and feed along with it a liberal allowance of bran, shorts, oilcake or cottonseed meal, about one pound of meal to four pounds of milk, which is continued well into the winter. If any cows are not giving satisfaction we fat them and sell for beef.

Our cows freshen during the month of April and early part of May, are soon ready for the pasture, and we keep up with a good flow of milk all summer and have them ready for a good winter's work, when we have plenty of time to feed and care for them. We count considerable on winter milk, when we can get good prices from the condenser or the city of Toronto.

It cost us during the month of December 75 cents per 100 pounds to produce milk.

Our cows are Holstein grades. We use a pure-bred Holstein sire, and select the best calves from the best cows. The calves are well fed, so as to get growth, and have them drop their first calf at two years old. We milk our heifers for a good long season, so as to form good milking habits, preferring a good flow of milk for a long season rather than a big flow for a short season.

Wm. W. Bartley, Belmont: Received your letter in which you informed me of being winner of fourth prize in the Dairy Herd Competition, and enquiring for my method of feeding and building up my herd. I will say briefly that I have been weighing each cow's milk separately, and keeping daily records and disposing of the poor cows year by year, and also buying new ones as good as possible to my knowledge.

This is my method of feeding in the winter: In the morning I feed each one pound of meal consisting of mixed grain and bran, after which they get corn stalks and followed by straw, and then turned out to water at 11.30 a.m., after which they get hay. In the evening at 6 o'clock they each get one pound of meal, followed by a small feed of hay and then straw. This diet continues until they freshen, as I try to have them freshen the latter part of March or the 1st of April, and then they get all the hay they will eat, and I increase the meal.

In the summer they are tied in the stable for milking and fed a little meal night and morning all through the summer, and have pasture from one acre to one and a quarter acres per cow, and they are fed green corn when it is ready, about the middle of August.

The cost of feeding for a year per cow is about $40. For the year we sent to the factory 72,142 pounds milk, making an average per cow 9,016 pounds for eight cows, and only sending six cows' milk up to May 20th.

Geo. Bourchier, Plattsville: I am in receipt of your letter telling me of my success in the Dairy Herd Competition, and a request to briefly outline my method of feeding. I will admit that I was most agreeably surprised to get a prize, as I deem my cows rather poorly fed, indeed.

My farm contains only twenty-five acres, thirteen of which is pasture, two acres taken up with buildings and orchard, leaving ten to grow fodder; say, two acres corn, two acres mangels, two or three acres clover, and the balance in Hungarian grass. I run most all my feed through the cutting box, mixing clover, corn, and Hungarian grass together (I find Hungarian grass, cut and cured at the proper time, one of the best foods for milch cows). During the winter my cows get this mixed cut feed, all they will eat up clean, and mangels. Occasionally I give a feed of long hay for a change, no bran or chop of any kind, but when they freshen in the spring I feed half a gallon bran morning and evening, continuing all summer, until I commence to feed mangels again.

During the summer months my cows run upon the highway in the daytime (for which privilege we pay one dollar for each cow), and in my pasture at night. I use only a thoroughbred sire, and raise only the heifer calves from the best cows, paying particular attention to persistency of flow of milk during lactation period, rather than large flow for the first few weeks and then dwindling down to nothing.

I might add that the milking is done in the stable the year round by my wife and myself, and done thoroughly.

C. JOHANN, Belmore: In reference to your enquiry as to breeding, feed, and care of our cows, would say, we started about eight years ago with a bunch of cows of no particular breeding, mostly bought at auction sale of cows shipped in from other parts in the fall. We used with these the best Holstein sires we could buy, changing every two years.

We weighed and recorded milk of each cow once a week, and test the milk often enough, perhaps two or three times in a season, and make up the yield of each cow at the end of the year, then disposing of the poorest ones.

We attribute our success in obtaining the prize in the Herd Competition entirely to this weighing, testing, and weeding process, for our cows got no extra feed or care all summer. They were turned out to grass in May, and had nothing but grass until the middle of October, when we fed them some corn night and morning, drawn out to pasture field.

SEYMOUR CUTHBERT, Sweaburg: In reply to your letter as to how I manage my herd of cows, I will say, in the winter months we feed corn fodder and hay and oat chop, about two quarters a day in the spring. When the cows are milking we feed a limited amount of oilcake and bran, and oat chop mixed and sugar beet. When the pasture is good we feed once a day oil cake and bran. About the first of July we feed green peas and oats; later on we feed green corn, roots, shorts, and bran and alfalfa twice a day.

The number of cows we milked last summer was twelve, two 2-year-old heifers. The breed is Holstein grades.

PROFITABLE DAIRYING.

N. P. HULL, DIMONDALE, MICH.

I am glad to be with you this afternoon, and I do not know that I ever enjoyed any Convention better than your meeting at St. Thomas last year.

Your President said he was glad to have men from the other side come over here and tell you things you do not know. I am sorry that I have to disappoint you, but I cannot tell you things that you do not know. I do not pretend to be

a professional man or a profound experimenter along dairy lines. I am merely a common, ordinary dairyman, the same as yourselves. What I know about dairying I learned in my cow barn, in feeding and caring for the cows, and with a lead pencil in my hand trying to keep track of things and find out how to get the greatest profit out of a herd.

I am to talk to you to-day on "Profitable Dairying," and I have no apology to make for doing so, because I know many of you like a good dairy cow and you like the business. I like dairying better than ordinary farming, because there is a good profit to be made out of it; but I do not like dairying well enough to put in days and years of my life growing fodder and feeding it to cows and milking them, if at the end of the year I cannot see that I have made something out of the business. I have not very much patience with the man who is willing to put in his time and get nothing for it. I feel confident in talking to you about dairy conditions to-day. The conditions that make dairying profitable in Michigan are the same conditions that will make dairying profitable in Canada. You must have certain things to make your business profitable. Is dairying profitable? I maintain that it is. And I am going to make this statement, that every man on a farm in Canada ought to keep before him two distinct propositions. First, he should sell as many dollars' worth of stuff off his land each year which will carry with it the largest percentage of profit possible. You are all with me in that proposition. The second is, that we should so handle our farms that we shall be able to maintain or increase the fertility of these farms so that we may go on year after year selling more dollars' worth of stuff which will carry with it the largest per cent. of profit. I do not believe you want to question that proposition, because if you are going to live on your farm in the future you must maintain the land so that you will be able to grow feed profitably.

I suppose you are also troubled about the question of keeping your boys on the farm. You must understand that a boy is a sensible critter, and if you expect to be able to persuade that boy to stay on the farm you have got to appeal to his senses as well as his sentiment, and have to show him that his life on the farm is going to be profitable and agreeable. Therefore, I feel that I am safe in making that statement, that every man who is a farmer ought to feel that he wants to sell as many dollars' worth as he can, and at the same time maintain the fertility of his soil. With these two propositions before you, I want to say that there is a profit in dairying, and I believe I can prove it.

I admit that in some instances, by the right sort of rotation and the intelligent use of fertilizers, a man may be able to keep cropping his land year after year without putting back any barnyard manure; but I am here to assert that if the fertility of the farms of Canada is to be kept up for the next twenty years it will be because the men of Canada adopt some line of live stock husbandry and feed the roughage of the farm and return it to the farm in the way of barnyard manure.

What line of live stock husbandry shall it be? I would say dairying, because the dairy cow has from the very nature of things the ability to take feeds we produce upon the farm and to convert them into a great amount of digestible food for human consumption, and more so than any other animal extant. Three pounds of good milk will furnish as much digestible nutriment as will a pound of beef steak, and it can be produced for one-fifth of the cost.

Let me contrast a dairy cow with a beef animal. You have to put in a certain amount of time carrying food and giving it to the steer to make it dress a pound of beef. What is a pound of beef worth? I presume you sell it as low as

five cents a pound, and perhaps as high as 10c. Now, if, instead of feeding that to the steer you fed it to the dairy cow, she would convert it into two pounds of cheese or a pound of butter, which would be probably worth not less than 15 cents and as high as 30 cents a pound. A steer will convert it into beef steak at five cents a pound, and a good cow will convert it into butter which is worth from 15 to 30 cents a pound. Some one says there is more work with a dairy cow, because you have to milk the cow. That is true, but I maintain that the difference in the cost of production is in no way commensurate with the difference in the price. Another point is that in dairying we eliminate all chances of speculation.

Take the crops that you grow. Some years they pay and other years they do not. Take hogs and sheep. Some years they pay and some years they do not; but the dairy cow pays you twice a day for the feed you give her, and a good profit besides. With the steer you have got to keep open a credit account with it for two years before you get any returns.

If I were over on my farm to-day I would walk behind two rows of dairy cows, and I would know that I was going to get my pay from them twice that very day. If your cows are not profitable, you can soon find out and get rid of them or adopt some better method of feeding and handling them so as to make them give you a better return. If you desire anything more on this question to prove that you can do so, look at the chart that our friend Mr. Herns has been speaking about. One man scores 7,422 pounds of milk from each cow, and if he is a good dairyman he will keep them giving milk for ten to eleven months in the year.

Dairying is profitable. But I am not here to assert that every man who is dairying is making a good profit to-day. But that is not the fault of the dairying; it is the fault of the man who is keeping the cows. Some men are keeping cows at a loss, others are keeping the proper breed, and those are the men who are carrying on the business in a proper way, and who are making a splendid profit. A gentleman speaking in Chicago said that the labor unions were calling out the men on strike because they were not getting enough pay, and he said: "I wish the men in the dairy business would call out a strike because they are not getting enough pay from their cows for the labor they are putting on them." And I tell you that there are a lot of men putting in their time laboring with the dairy cows in Canada and Michigan who ought to go on strike because these cows are not paying those men the wages that they ought to receive, and a man is very foolish if he goes on working with cows day after day without getting proper compensation for his time and labor.

Two men are sending their milk to the same factory, living just one mile apart along a country road, having exactly the same breed of cows. And the first man gets 6,299 pounds of milk per cow, and the other man only receives 3,332 pounds of milk per cow, just a little over half the milk per cow as the first man. The first man receives 303.8 pounds of butter fat per year and the other man 140.4 pounds. The value of the butter fat from the first herd was $89.48, and the value from the second $38.20. The cost of the roughage to the man who got the most milk fed to his cows was $24.25, and the roughage the other man fed was worth $39, $15 more than the first man fed. The grain the first man fed was worth $11.52, and the grain the second man fed was worth $3.80. The first man was feeding three times the value of the concentrates. The total cost of the feed of the man who got the most milk was $35.81, and the total cost of the feed of the man who received the least milk was $42.83. It actually cost the man who got just a little over half as much milk $7 more per head to feed his cows, and

the first man made a profit of $53.67 per cow, and the second man suffered a loss of $4.63 per cow. For every cow the second man had in his herd he made a loss of $4.63, whereas the other man received pay for his feed and received more than two dollars for every dollar's worth of food he fed. Just think of a man putting in all that labor and keeping these cows and losing 12 cents on every dollar's worth of feed he fed them.

There is the question of profitable dairying and unprofitable dairying. There is the difference between the man who is dairying and the man who is not. One man putting intelligence into his business and the other man not doing so. If you tell me how much care and intelligence a man is putting into his dairy business I will tell you the results he is getting. You must first know the principles of dairying, and then put them into practice.

There are three principles of dairying as far as production is concerned—essential privileges that every man must practice if he is going to make a profit. First, you must have a good cow. Second, you must give that cow the right sort of feed, and plenty of it. Third, you must give that cow the right sort of care. These three things work out the success in dairying all over the world, and the farther you get away from these principles the farther you get away from success. The difficulty with the man who lost over four dollars on each cow was that they were too near being born steers. There are some cows that have the ability to take feed and convert it profitably into milk; other cows have not that ability.

There are three kinds of cows in the United States. One takes her food and digests it, and because of her inborn tendency converts it into flesh. That is the beef cow. I do not care what breed she is, if you want to succeed in dairying you ought to make beef of her. There is another kind of cow that takes her food and digests it, and because of an inborn tendency she converts it into milk, and that is the dairy cow. I do not care what her color or breed may be; she may be a Jersey, a Guernsey, Holstein, Shorthorn, Hereford, or Ayrshire. There is another class of cow that takes her food and digests it, and no one knows what she does with it. She does not either make beef or milk. How many of you have these kind of cows? How many of you know that your herd is composed of dairy cows?

I stood behind two cows in a stable last year, and the owner told me that he got ten dollars more from one cow than he did from the other. Supposing I had a herd like one of these cows, and you had a herd like the other, you would have to work ten years to attain the results that I attained in one year. We must wake up to these propositions and get rid of the poor cows. I have seen a man work year in and year out, and his good woman working harder than any woman ought to work, and I have seen the boys and girls kept out of school in order to help with the work, and at the end of the year that farmer was no better off than at the beginning of the year. I have seen right alongside of that man another with his family not working nearly so hard, and they were a great deal better off at the end of the year than they were at the beginning.

Plenty of cows have been condemned as poor cows because they were never given a chance to do well. They are never fed properly and cared for, and they were not to blame because the results were not what they should have been. Some men are like Pharaoh of old, trying to make their cows make bricks without straw.

I used to buy my cows, and I bought a cow from a certain man, and after I had paid for her I said to him: "What is the matter with this cow that you are selling her so cheap?" And he said: "She is your cow now, and if you like I

will tell you." I said that I would like to know, because she looked to be a pretty good cow, and he said that she did not give much milk. He said he had five more cows that gave considerably more milk than she did. "She does not give enough milk to pay me, so I have sold her to you." I took her home and she freshened on the 4th of October, and we kept her until the 14th of August, and she gave 14,556 pounds of milk, and she made me one hundred and forty-three dollars and some cents. I met that man one day and I asked him how much his cows cost him to feed them, and he said he had never stopped to figure it out. He told me, however, what he fed his five cows—corn, clover, and grain. He sold to the same condensing factory that I did, and I went there and found out how much he was receiving for his milk. I found that I had made more clear profit out of that supposed poor cow that he sold me than he had made out of all the cows he had kept. That man fed his cows generously enough of certain things, but he did not feed them right. He turned his cows out of doors in the morning, and left them there until he came back from work at night, to give them exercise. That is not the proper thing to do with a dairy cow; she should be kept in warm, comfortable quarters and given the best possible care.

I would advise you to have your cows freshen in the fall, because they will give more milk than they will if they freshen in the spring, and it is easier to obtain hired help in the winter time, and it will pay you better to milk your cows in the winter when you can receive higher prices for dairy products.

Get a good cow, feed her right, and take proper care of her, and she will be profitable, and you will be in a profitable business, and you will be better off as the years go by. (Applause.)

THE CHAIRMAN: We have a very important address from Professor Edwards on bacteria and bad flavors in dairy products, illustrated by lantern slides. Addresses of this kind have been considered dry at our Convention, especially by farmers, but I think if there is any one part of dairying that the farmers are deficient in it is from a bacteriological standpoint, and until they begin to realize the importance of these subjects we will not arrive at a standard that we should.

BACTERIA AND BAD FLAVORS IN DAIRY PRODUCTS.

PROF. S. F. EDWARDS, O. A. C., GUELPH.

During the summer of 1909 we began some experimental work on the problem of so-called fruity flavor, or sweet flavor, in cheese in Western Ontario. We started out with the supposition that the trouble was due to yeasts. Accordingly, we secured samples of whey from factories where pasteurization of the whey was not practised, twenty-five samples from twenty-five factories being examined. From these twenty-five samples we were able to secure twelve distinct varieties of yeasts. Some of the yeasts were found in the whey from more than one factory, and some factories had several varieties of yeast in the whey. These several yeasts have been kept growing in the laboratory, and further study has been made from time to time as to their action in milk and in cheese.

ACTION OF YEASTS IN MILK.

Cultures of the yeasts were introduced into pure milk, allowed to grow, and the milk was then examined for flavor by two practical cheesemakers, the flavors of the various milk samples being described as follows. (For convenience, the yeasts have been designated by letters and numbers.):

Yeast A 2.—Stagnant water flavor.
" A 5.—Distinctly yeasty.
" B 2.—Putrefactive flavor.
" B 4.—Rotten.
" D 1.—Typical factory off-flavor.
" J 1.—Pure yeasty flavor.
" J 2.—Yeasty flavor.
" K 1.—Rancid butter flavor.
" K 3.—Barnyard flavor.
" O 1.—Strong yeasty flavor.
" P 1.—Typical old sour whey tank flavor.
" X 2.—Slightly yeasty.

Action of Yeasts in Cheese.

Three lots of experimental cheese have been made, using cultures of the whey yeasts in the milk from which the cheese were made. The cheese were made in the College Cheese Factory, and ordinary factory conditions were simulated as closely as possible.

Three cheese were made December 15th, 1909, kept in an ordinary curing-room, and judged at three different periods, each time by practical cheese men.

The cheese are designated by letters corresponding to the yeast varieties used as starters.

The results as stated by the judges follow:

A 5—January 7.—Rank flavor, similar to flavor produced from rusty cans.
April 1.—Rough texture. Flavor not clean. Such as many times met with in factories.
June 30.—Bitter flavor.
D 1—January 7.—Weak body. Flavor not clean.
April 1.—Pasty texture. Whey flavor. Bitter taste. Typical of ———— factory. This factory pasteurized the whey in 1910, and had no trouble from fruity or bitter flavor.
June 30.—Fermented and stinking flavor. Bitter. Rotten.
K 3—January 7.—Pronounced yeasty flavor.
April 1.—Pasty texture. Flavor not clean.
June 30.—Flavor bitter. Astringent.

The results of these three cheese would tend to show that the off-flavor caused by yeasts develops early and does not pass off as the cheese gets older.

Cheese made in the College Factory at the same time as the above, without cultures of yeast, were clean in flavor and remained so.

A second series of cheese was made in February and March, again using cultures of whey yeasts as starters. Ten cheese were made on this series, between February 18th and March 2nd. These cheese were kept in the College cheese curing-room, and were judged April 1st by the Dairy Instructors of Western Ontario, June 30th, by Mr. Herns and Mr. McKay, and January 5th, 1911, by Mr. McKay. The results follow:

A 2.—April 1—Shows some mottles. Not clean in flavor. Very pronounced acid taste.
June 30.—Astringent taste. Stinking flavor.
Jan. 5.—Old, rotten flavor. Texture poor.
B 2—April 1.—Some mottles. Slight fruity flavor. Strong bitter taste.
June 30.—Fruity. Bitter.
January 5.—Typical old, bitter stink. Texture good.
B 4—April 1.—Some mottles. Bad flavor. Weak body.
June 30.—Very salvy. Fermented. Fruity. Dirty.
January 5.—Dirty and rancid. Greasy texture.
J 1.—April 1.—Weak body. Marked fruity flavor. Color a little off.
June 30.—Very bad fruity and rotten flavor. Bitter taste. Typical of ———— factory.

January 5.—Very dirty. A stinker.

J 2—April 1.—Sour flavor.

June 30.—Deep, very bitter taste. Fruity. Texture salvy.

January 5.—Old flavor. Very bad taste.

K 1—April 1.—Bad fruity flavor. Like fruity flavor met with at factories. Worst tasting of lot.

June 30.—Very bitter taste. Fruity. Fermented.

January 5.—Dirty. Stable flavor.

O 1—April 1.—Weak body. Bad taste.

June 30.—Off flavor. Fruity. Bitter taste.

January 5th.—Dirty flavor.

P 1—April 1.—Characteristic texture of bitter-flavored cheese. Bad, fruity flavor. fruity taste. "A bad one."

June 30.—Decidedly bitter taste. Slightly fruity. Rotten flavor.

January 5.—Very fruity. Most fruity of the lot.

X 2—April 1.—Beginning to develop mottles. Marked yeasty flavor. Typical flavor of ———— section.

June 30.—Typical off-flavor often found in old cheese at high temperature. Rotten-egg flavor.

January 5.—Bad, dirty flavor.

Russel.—April 1.—Mottles beginning. Genuine factory fruity flavor. Very bad.

June 30.—Very distinct pineapple flavor. Pineapple taste with bitter after-taste.

January 5.—Fruity. Distinct pineapple flavor.

When judged January 5th, all the cheese tended to a rancid flavor.

After judging them on June 30th, these ten cheese were placed in cold storage, where they remained until January 6th, 1911.

Results with these cheese also indicate that the yeasts produce the bad flavor early, and that the flavor gets worse rather than better as the cheese ages.

A third series of cheese was made, using cultures of part of the yeast varieties, in August, 1910. In this series, six varieties of yeast were used, and two cheese were made with each variety as a starter. Both cheese of each pair were made from the same lot of milk, and the cheese were handled in exactly the same manner. As soon as the cheese were all made, one of each pair was placed in a cool curing-room at ordinary temperature. Two normal cheese were made at the same time, one being kept in the Woodstock cool curing-room, and the other in the College curing-room, to serve as checks on those in which yeasts were present.

Of these two lots of cheese those in the cool curing-room were judged the last of December by a prominent cheese buyer and one of the Dairy Instructors, and those in the College curing-room were judged January 5th by Mr. McKay, of the College.

The results in the two lots are as follows:

B 4.—Cool curing room—Fermented whey flavor. Body fair.

B 4.—Warm curing room—Rancid. Dirty. Texture salvy.

J 1.—Cool curing room—Strong fermented flavor. Body weak.

J 1.—Warm curing room—Dirty whey tank flavor. Texture coarse. Extremely dirty flavor.

J 2.—Cool curing room—Very bad off-flavor. Texture sticky.

J 2.—Warm curing room—Rancid and dirty. Texture sticky.

P 1.—Cool curing room—Strong fermented flavor. Body salvy.

P 1.—Warm curing room—Very yeasty and rotten. Texture salvy.

X 2.—Cool curing room—Not clean in flavor. Texture gritty.

X 2.—Warm curing room—Slightly yeasty. Texture sticky.

Russel.—Cool curing room—Strong fermented flavor. Body fair.

Russel.—Warm curing room—Very bad off-flavor. Very yeasty. A little fruity. Very bad.

Normal cheese.—Cool curing room—Slightly off flavor. Good texture. Best flavor of the lot.

Normal cheese.—Warm curing room—Flavor good. Texture good.

In these lots of cheese there was again demonstrated the fact that the yeasts originally found in the factory whey tanks were able to cause undesirable flavors in the finished cheese, and that when the flavor is once produced in the cheese it does not pass off.

Prevention.

Three factors enter into the prevention of off-flavors by yeasts or other organisms. The first is cleanliness. Careful investigation has shown that the undesirable bacteria in milk get there mostly during milking, and the subsequent handling of the milk before it leaves the farm. Hairs, bits of straw or other bedding, hay or other feeds, particles of manure, dust of the stable air, the clothes and hands of the milker, unclean utensils, all contribute their share to the variety of germs in the milk. With clean milk or cream, the maker will be better able to turn out a clean flavored product with a better keeping quality, which ultimately means more money in the pocket of the man producing the milk.

The second factor in prevention of off-flavor is cooling. It is manifestly impossible, even with great care, to prevent some germs getting into the milk. These may be prevented from doing so much damage, however, if the milk is cooled immediately after milking to a temperature low enough to check their growth. The extensive and careful experiments by Barr, of the Dominion Department of Agriculture, show the importance of cooling, without aeration, of milk or cream in preventing gas production with its attendant loss in flavor and the value of the product.

In some laboratory experiments at Guelph we took some sweet milk, divided it into two portions, placing one at a temperature of 70° Fah. and the other in water at a temperature of 53° Fah. In one experiment the milk kept at 70° was firmly loppered in twenty-two hours, while the milk at 53° did not lopper for five days. In another test of the same nature, the milk kept at 70° loppered in thirty-six hours, while that kept at 53° required 136 hours, or nearly six days, to lopper. The fact that milk under ordinary conditions keeps sweet longer in winter than in summer is due entirely to the less rapid growth of the milk bacteria in cold than in warm weather.

The third factor in preventing off-flavors is pasteurization of the factory by-products. Especially is this true of whey. The results in our own experimental cheese show, as do those of other investigators of this problem, that so-called sweet flavor, or fruity flavor, and bitter flavor, may be caused by yeasts which get into the milk on the farm. Suppose yeast gets into the milk on the farm of Mr. A., who sends his milk to the cheese factory. In the course of the ordinary factory operations part of the yeast cells from A.'s farm go into the cheese and part into the whey tank. Here conditions are very favorable for rapid multiplication of the yeast, and when the whey is drawn off next day the yeasts go out, not only back to A.'s farm, but to all the other farms sending milk to that factory. Unless all the patrons of the factory scald their cans thoroughly enough to kill the yeasts, and there are always some who do not, they remain alive in the cans, multiply in the milk over-night, and go to the factory next day in greatly increased numbers. The trouble is thus somewhat of the nature of an epidemic of disease. As long as conditions are favorable for the growth of the yeasts, they will continue to grow and cause bad flavors in the cheese.

The epidemic can be stopped by pasteurization of the whey at the factory. Our laboratory experiments have shown that these yeasts are readily killed at 155° Fah., the temperature commonly employed in factory pasteurization, and

are thus in strict conformity with practical results obtained in factories where pasteurization is practised. Of a total of one hundred factories in Western Ontario, which pasteurize the whey, only two or three have trouble from sweet or fruity flavor.

Another important consideration, especially from the farmer's standpoint, is the conservation of the feeding value of the whey. In pasteurized whey the fat is unchanged and remains evenly distributed throughout the whey tank, thus ensuring that each patron receives his proportionate share of this component of the whey. The sugar remains unchanged, whereas in sour or fermented whey the sugar is partly or wholly converted into lactic acid, thus greatly lessening the feeding value of the whey. The feeding value of sweet whey has been shown to be 25 to 33 per cent. greater than in sour or fermented whey.

Before concluding, I would like to offer the opinions of some buyers and some makers on this problem of fruity flavor. Letters from six buyers and exporters state that the cut in price of cheese having sweet or fruity flavor is from one-quarter to two cents per pound, depending on the extent to which the flavor was present, the cheese being free from other defects. Aside from the fruity or sweet flavor, the defect is frequently accompanied by weak body and poor texture. Letters from two makers I will give practically in full:

December 28, 1910.

Dear Sir,—Your letter of the 13th in regard to bitter milk. During the past three years that we have been pasteurizing our whey, we have not been bothered much with the bitter milk. It means in sales about $4,000 a year, and in pounds of cheese another $1,000, and in work and worry it means a great deal to a cheese maker, and your cheese is not so good in any way when bitter flavor is present.

It would be hard to estimate what is the loss in cheese, as the average is always high when you get bitter milk, about 40 lbs. to the vat, and the loss in sales would be about 1-8 cents per lb. I hope never to see bitter milk again.

Yours truly,

(Signed) .....

December 19, 1910.

Dear Sir,—In answer to your inquiry of December 13th relative to bitter flavor.

Firstly, there is no question of a doubt that the pasteurizing of the whey, properly done, is the remedy for bitter flavor. It is hard to place any figures on what it means in dollars and cents to our patrons, directly, but it has certainly raised the standard of the quality of our cheese. It also has had a decided improvement on the flavor of the milk at our factory. I do not notice it as much now as I did immediately we began pasteurizing. We do not return one-tenth the amount of milk since we adopted the system. Perhaps partly because the patrons are taking more pains with cooling their milk, etc. In regard to our work in the factory, I never felt safe to leave the vats after cutting till dipping, as I never knew where the bitter flavor was going to develop, as we were seldom disappointed in not having two or three or more every day. We have had to dip six curds in fifteen minutes from the time the first one was out until the last was in the sink, which meant a lot of rough handling, and a loss to our patrons. To be brief, I think it means a man's work less in our factory, and a great many more nights' sleep for me.

Any information I can give you at any time will be cheerfully given. I could perhaps tell you more if I were to see you and make you understand it better.

Yours truly,

(Signed) .....

To sum up briefly:

Results secured with twenty-seven experimental cheese show that the off-flavors of cheese known as sweet flavor, fruity flavor, or bitter flavor, are caused by yeasts. These yeasts, as well as other contaminating organisms, usually origin-

ate on the farms of factory patrons. They may get into the whey tank, be distributed with whey throughout a neighborhood, and multiply to such an extent as to cause a serious epidemic of off-flavored cheese in that section.

Three factors enter into the prevention of this trouble, viz.: Cleanliness in producing and handling of the milk, cooling of the milk to as low a temperature as possible on the farm, pasteurization of the whey at the factory.

COW TESTING.

C. F. Whitely, Ottawa.

Mr. Whitely's address is the same as the one delivered in the Eastern Dairymen's Association and will be found in that report.

NOMINATING COMMITTEE.

The following were appointed members of the Nominating Committee:—Robert Myrick, Springford; Robert Thompson, Atwood; Roland Johnston, Bright; Jas. Bristow, St. Thomas; Franks Boyes, Dorchester.

WELCOMED BY THE MAYOR.

Mr. John Brown, Mayor of Stratford, was introduced, and gave a wholehearted welcome to the members of the Convention. He regarded Stratford as the real home of the dairy industry.

ADDRESS.

James Torrance, M.L.A., Milverton.

I assure you it gives me unmixed pleasure to be with you on this occasion. It has always been a pleasure to meet the farmers in any capacity, and I welcome you on behalf of the County of Perth, particularly North Perth, of which I am a humble representative. I also give you a hearty welcome to the classic city of Stratford in the County of Perth, the pioneer county in the dairy industry in this country, and the pioneer county for the first prize cheese in the whole Dominion of Canada. (Applause.)

Some of you will be surprised when I tell you that the township of Elma this year reaped nearly one half million dollars in cheese alone, and if you go to Old London or Liverpool you will notice in the cheese markets the sign "Elma Cheese for Sale." I think that is a great advertisement for this county, and for the Province of Ontario, and greatly to the credit of the farmers of the township of Elma. Cheese is not the only thing they produce in the township of Elma; because they grow good strong men and very pretty women. (Applause.)

You have on the platform the Hon. Minister of Agriculture, with whom I am an associate in the House, and I am pleased to see him here to-night in this, the fairest of the smaller cities in the Province of Ontario: and I also see my old friend the ex-Minister of Agriculture, and I am pleased to know that he is going to address you to-morrow evening.

We are wont to praise all the great resources of this Province of ours—in our mineral wealth and our water powers and various other natural resources that are hidden in the earth—but let me tell you that the industry that you are representing here to-night is worth all the rest of them put together. Ontario is to-day, and for ever will be, an agricultural country; and it is up to every farmer in this Province and every man in the city, whether professional or merchant or mechanic, to see to it that the Province is kept in the front rank in agriculture. I am sure that the present Minister of Agriculture will do his duty. He has done well in the past, and we are looking for greater things in the future. The Government has done a great deal for the farmers of this country through the Agricultural Colleges. Students leave that college and scatter all over this Province and disseminate the knowledge they have received, and thus get the farmers in their neighborhood to farm in a better and more scientific way.

Then we have the Experimental Union doing good work, and we have the Farmers' Institutes where practical farmers gather together and talk on the various methods of agriculture, and your Eastern and Western Dairymen's Association, by no means the least of the forces that are working to-day in the interest of agriculture in this Province. We have also the Fruit Growers' Association and many other Institutions to help along this great work.

The grants to such institutions during the last six years have nearly doubled, and we appreciate that; but we want to do still better. This is a growing time, the people are growing rich. The time we are living in demands it, and we are confident the Minister of Agriculture will do his duty in this respect towards the farmers of the Province.

I would like to refer to one item to show what is being done by the College. Professor Zavitz stated before the Royal Commission that some twelve years ago he introduced a new barley into this Province—Manchuria barley—and, as a result of that, for the past twelve years the average yield of barley has been doubled and $300,000 has been put into the treasury of the farmers of this Province. That item alone will more than pay for the maintenance of the College during that time. I hope the Minister of Agriculture will see that a representative of the farming industry is established in one of our northern towns in Perth county in connection with our high schools.

Dr. Clarke, Dominion Seed Commissioner, tells us that the weeds are growing at a great rate in this Province, and that if the farms were kept clean the result would be that 10 per cent. more money would be made on the farms. That would mean to the farmers of this Province that in 1909 the field crops would have amounted to $40,000,000 more than they did, and that $40,000,000 would go into the pockets of the farmers.

The word "conservation" is becoming a household word, and I fear some of our people are taking advantage of that familiar term because the Government of our country are appointing commissions and taking steps towards the conservation of our resources. Some people are taking advantage of that in order to shift the responsibility on the shoulders of their neighbors. Every man in this country has a responsibility, and I hope that the people of this Province will see that not only the natural resources are conserved and developed, but they will see to it that the greatest asset that this Province has is the school children of the country. Let us see that they are properly educated and directed in the best channels possible for the welfare of this great Province. We often speak of "The Three R's," but I feel like substituting something else. I feel like saying they should develop a healthy and a well-trained and educated mind and cultivate a spirit of British Canadianism

that ought to actuate and permeate every person in this land. (Applause). Let us see to it that our children are properly educated along these lines, and there is no place on this side of Heaven where the opportunities are so great as on the farm with its environments.

THE FARMER OF TO-MORROW.

N. P. Hull, Dimondale, Michigan.

I feel that I am just at home with you in this meeting. I am glad to be here and I want to assure my farmer friends that we are in fast company and that this is a mighty fast age. An age of electricity, an age of flying machines, of automobiles. We are living in a great age, and it is worth one's while to live to-day. If you had no other object in life than just to sit down and see what other dairymen are doing, it is worth while living.

I am only just turned 40, and a lot of wonderful things have been accomplished during my lifetime; if the farmers of this country are to keep up with this wonderful onward march of progress they have got to move some, and I say to you my farmer friends that agriculture must keep up with this onward march of progress. I want to say to you that the perpetuity and the glory of any nation rests on the shoulders of one class of people, and the building up of this great American nation of ours rests on the shoulders of the American farmer—and by American farmer I mean you as well as the farmers on the other side of the line; and if the farmer of to-morrow is a better farmer than the farmer of to-day it will be because the farmer of to-day travels the plane that makes for better things.

What is our plain duty as patriotic citizens of this great American nation of ours? It is to make it possible for the boys in our home who are to be the farmers of to-morrow to occupy a higher plane than we occupy to-day. The farmer's equipment in years gone by was merely a matter of muscle and power. I can remember when we hired a man at so much an acre to cut down the trees with mighty blows and turn them into logs. In those days a farmer was largely a matter of brawn. But the farming of to-day, and the farming of to-morrow, will be more than ever a matter of brains. I do not think we farmers are giving our boys a square deal, neither are we giving our farms a square deal, neither are we giving this great industry of agriculture a square deal. You send your boy into the common schools and let him go through the common schools, and graduate him from there and send him to the High School, and during all this time you have not even intimated to that boy that there is just as much room for brains upon the farm as there is in any other business. I want to say to you that there is no business upon earth that requires stronger brain power, better judgment, and more mental equipment than it takes to handle a farm. We must realize that, and equip these young men who are to be the farmers of to-morrow with the agricultural instruction that will enable them to take hold and grapple with the problems of the future and handle them successfully.

When the question of the American Indian came up in our country, and when we took away his lands, it was said that we ought to give him something in return, so as to make him a peaceable citizen; and the conclusion they came to was that in order to make an Indian the best citizen they would give him an industrial education. We gave him that education in order that he might be the

best possible citizen. When we freed the black men in the South, the question was to make of them American citizens, and at once our statesmen said if you are to make of that black man an ideal American citizen you must give him an industrial education—teach him how to do things in the best way possible.

We must give that boy an industrial education, but we must occupy a higher plane. We must travel on a plane that inclines upward, because we must be better farmers to-morrow than we have been to-day. We have been in the habit of thinking that we know more about agriculture to-day and that we will be able to do better work to-day because of the wonderful work that the professors have done in our Agricultural Colleges. I am not here to detract from what the professors in the Agricultural Colleges may do. I believe in having them do all that is possible, and they have been doing wonderful work, and I hope they will go on doing it in the future. But the question is: Are we farmers willing to do our part as well as those other men? When you stop to think of the wonderful advance made in agriculture, you will find that it has not come so much from the Agricultural Colleges as from the men on the farm, who are next to the soil—milking the cows and growing feed and corn and other crops.

Let me give you an illustration. My grandfather forty years ago thought he could grow better corn after a crop of clover than he could after any other crop. He discovered there was something in the clover crop that would help other crops to grow better. A professor comes along with a microscope and makes a study of that, and he finds there is a germ upon the roots that gives the clover power to take nitrogen from the air and leave it in the soil. It was the farmer who first discovered it, and the agricultural professor who then explained it.

If we are to improve this great agricultural education it will be because you on your part wish it to be done.

The farmer of to-morrow must believe in himself and in his business. One of the great problems that confront mankind to-day is that of the fair distribution of the wealth of the world, and that is something that we must pay attention to. I want the farmer of to-morrow to rise to the occasion, and to realize that he is both the laborer and the employer of labor; that he is both a capitalist and a workman; and that he has more liberty and greater diversity of employment than other men; and I want him to understand that the farmer of to-morrow is going to solve, to a certain extent and a certain degree, a satisfactory and equitable working out of some of these great problems.

I am sorry that the farmer of to-day does not believe in himself as he ought to. I stopped with a farmer a year ago in Michigan, and he said to me: "Do you know that at one time I had an opportunity of going into a store, and had I gone I might have owned that store; but now I am just a farmer," and he kind of shrunk down into himself. There was a man with a wife and family of boys and girls, and he was apologizing before these boys and girls for being a farmer. Another farmer said to me: "I had an opportunity of going into a bank as clerk, and I might have been President of that bank, but I did not do so, and I am only a farmer." I should like to point out to these men that they need not apologize to any man for being the first lieutenant of the maker of this world. (Applause.) Eighty-eight per cent. of the best teachers in our country are boys that have been brought up on our farms. Ninety per cent. of the best business men and best lawyers, doctors and ministers and statesmen were born upon farms, and I see no reason why a farmer should apologize for his calling. I say to you that the history of the world is that when other men have reached the top in other lines of work they have turned back to the soil, and while many of us are condemning

ourselves for being farmers other men who have exhausted everything else are turning back to the soil, and there is no better man in the world to-day than he who stands with his feet on the earth. (Applause.)

ADDRESS.

Hon. J. S. Duff, Toronto.

I am pleased to have the opportunity of participating with, not only the gentlemen who are associated in the work of your Convention, but also with the citizens of the city of Stratford who by their presence to-night and by their welcome that has been presented to you by his Worship the Mayor, are here countenancing your work.

We look upon the Annual Meeting of the Eastern and Western Dairymen's Association as being among the most important agricultural gatherings held in this beautiful Province of ours. When you think of it, we have a great many organizations in connection with agricultural matters, and when it is said that the Annual Meetings of these two Associations are among the more prominent of these that is saying a good deal, because very many of the other organizations are performing very important work, equally important perhaps as yours.

One of the things I wish to talk on for a few moments to-night is the importance of agriculture in Ontario—I am not going to say America—and I will tell you frankly, Mr. President, I do not wish to be called an American. (Applause.) I have every respect and every possible esteem for our American cousins across the border, but they are citizens of the United States of America, and we are citizens of the great Canadian Commonwealth—(applause)—and proud of our citizenship. (Applause.) I just thought I would say a word or two in reference to agriculture in this fair Province of ours, because agriculture is a business to-day the same as handling merchandise or manufacturing. It is fair to look around, in view of the great number of organizations that are at work to-day, and to ask ourselves: "Are we improving?" I am sure there is no man in the County of Perth who takes an active interest in farming, when he comes to honestly look into the matter, but will say great progress is being made along the lines of agriculture from year to year. We do not want any better proof of that than the fact that the farmers of Ontario are the most wealthy class of people in this great Province. There is a larger distribution of wealth and greater wealth per capita among the farmers than any other class of the community, and that cannot be true if we are not making progress; and while individual effort is being put forth by those who have farms, the Government of this Province and the Department of Agriculture are also in a small way, as far as it is possible, assisting the farmers in their work. We are spending almost three-quarters of a million of dollars in agricultural work, and perhaps I cannot do better than quote the remarks of Sir Edmund Walker, President of the Bank of Commerce, in his annual report, published in to-day's paper. In that report you will notice that he pays a compliment to the Agricultural Department of which I feel very proud, not because I am at the head of that Department for the time being, but for the work that Department has done in the last twenty or twenty-five years, and because of what we are doing to-day, and what is being done by the Government to-day as an outcome of the work initiated many years ago by those who have since passed off the scene. I said this is a great Province, and its greatness can only be imagined when we

take into consideration its variety and diversified climate. Down in the Counties of Kent and Essex we have a corn belt almost equal to Indiana and Illinois. In this section of Ontario, and very much further east down the St. Lawrence and Ottawa River section, we have as fine work being done in dairy lines as is done on the continent of America to-day. Then in the Niagara Peninsula our people are bending all their energies to the cultivation of fruit. They are getting away from the old-fashioned style of farming, and if any of you gentlemen should happen to be in Hamilton it would pay you to take a trip on one of the trolley lines to Beamsville and Jordan Harbor, where we have an Experimental Fruit Farm. In taking that 23-mile ride you will go through a section of the country that some years ago was something like these where they had the old-fashioned ordinary one hundred or fifty-acre farm and barns and houses. To-day that 23 miles is almost a continuous village, and I am satisfied that in a very few years a lady who would care to do it on a fine fresh morning would be able to walk the whole distance from Hamilton to Grimsby on a granolithic walk. Ten years ago there was a 200-acre farm close to the village of Grimsby, on which a farmer with his family resided and engaged such hired help as he required. After his death the farm was sold off into small fruit farms, and how many families do you suppose are living on that 200 acres to-day? You will be astonished when I tell you there are forty-one families living on that 200 acres at this time; and that is what is going on down in the Niagara District. A farmer in a grain-growing district may say: "How does that help me out, what bearing has that on my farm?" Every acre taken out of the ordinary agriculture, as we practice it, lessens the competition which we must meet in the markets of our own land for such products as we raise. You will say, "What is being done with the fruit?" Six years ago our people had not any market in the North-West Provinces. British Columbia was supplying fruit for the prairie Provinces. Two car loads were sent out by the Department of Agriculture and they arrived safely and were put on the market and disposed of; and from that little start we have supplied 35 per cent. of the fruit that was used in Western Canada for the past two years. Other sections are also growing peaches, and perhaps some of you have noticed that peaches are not very much cheaper than they were some years ago. Why? Because we are beginning to get other markets for the peaches of Ontario, and they can be disposed of at remunerative prices.

A year ago last summer our Deputy Minister was over in the Old Country on some business in connection with the Government, and he came home and said if we could only put our peaches on the British market, it would be a great thing for the fruit growers. I said, "Why cannot we?" and he replied that other efforts have been put forth but they have been failures. I got Mr. Hodgetts and commissioned him to go to Niagara district and select the best peaches and pick and pack them carefully, and I told him the responsibility would be on him to take care of these peaches until they were put on board the steamer. He did as he was directed, and they arrived in London in splendid condition. The Grand Trunk Pacific people and the Canadian Northern and Canadian Pacific people, who have offices in London, were anxious and glad to get these peaches for exhibition purposes in their windows. We also put some in the windows of our own office, and we sent them to the different fairs throughout the land and a portion of the consignment was sold at from 20c. to 25c. each. That was only a year and a half ago, and from that little start over six thousand boxes of peaches were sent to London from Niagara District last year, and Sir James Whitney, the Prime Minister of Ontario, sent a basket of Canadian peaches to his Majesty the King. (Applause).

We heard something to-night about our agricultural Colleges. I am not going to say we are doing any better work this year than last. We have to-day the best Agricultural College on this continent, and it is doing splendid work. But only a very small proportion of our people can have an opportunity of being educated at that College. It was always the plea of the Prime Minister of Ontario that there should be some opportunity afforded the people of the Province to have an agricultural education right at their door, where they could readily absorb the information and make practical use of it. I saw an illustration of that the other night at the town of Perth, where Mr. George Barr, who is engaged in the Dominion Department of Agriculture, gave limelight views on how to take care of the milk on the farm. I have heard a good many addresses at gatherings of this sort, and if you put all the speeches made at Perth together, and boiled them down into one, there was not nearly as much information brought home to the people in the whole of that as there was by the limelight views and the address given by Mr. Barr at that meeting. (Applause). We are endeavoring to do that sort of thing so far as our College is concerned, and the idea has been put into practice by placing men in every county in the Province who are graduates of the College and who get into close touch with the people. If it is a dairy county, an expert would be sent whose tastes were in the line of dairying. If a fruit section, then he should be in close touch with the fruit industry, and if a mixed farming section then he should be an enthusiast in that work. Where we have placed these men they have not revolutionized things, or turned farming upside down, but they are geting in close touch with the people in the county by talking with them as to how to get along, what is best to be done, holding short courses, and getting the people interested.

We had only six of these representatives at first, and now we have fourteen, besides assistants in some of the newer sections in Northern Ontario, and the work has been of such a practical nature and of such great benefit that we are not able to comply with the requests that we are receiving from other sections of the Province for representatives. For the time being we have neither money nor the men to increase this work as we would like to.

To show you how this work is appreciated I may say that I was at a banquet in the Town of Whitby last night, and in an address I referred to this work and to Mr. Hare, who is the Agricultural representative in that district, and as soon as I mentioned his name it evoked a round of applause that showed in no unmistakable manner the high appreciation they had of the work he was doing.

We are a great Province in some other ways. After I became a member of the Government it was part of my duty to go round to the different parts of the Province, and one of the first things that occurred to me after having gone about casually for two or three months was how little the people of Ontario know of Ontario. You have only to go through this great Province and meet with an audience such as you have here to-night to come to the conclusion that there is no more thrifty or prosperous people on the continent of North America than the people of the Province of Ontario. (Applause). Why should not we be good, and why should not we be great? Did not we come from a splendid ancestry? Who are the people of Ontario? This great Province was first peopled by the U. E. Loyalists. When the thirteen colonies threw off the yoke of Britain there were thousands of men who left their farms and their property and exiled themselves because of their love for the British flag and made homes for themselves on the northern side of the boundary line. Later on these were added to by splendid men from England, Ireland and Scotland, and those of you who know anything about

the early pioneers know that they were the grandest band of men and women that ever lived on God's green earth. We would be untrue to our ancestry, we would be untrue to the memory of the men and women who have passed away and who have left us this splendid heritage, if we were not fairly good, fairly prosperous, and fairly progressive; so I do not think that we have so much to thank ourselves for. I sometimes think we never appreciate the hardships endured, nor think of the privations our fathers and grandfathers had to suffer in order that we might be in the happy and splendid positions that we are to-day.

In Northern Ontario we have a wonderful place. Before I became a member of the Government I heard people talking of the great clay belt north of the immense rocky region where we have such untold mineral wealth. They said this clay belt was covered with spruce, and my ideas were that if it was a spruce forest it was a wet bog. But the opposite is the case in Northern Ontario. We have up there from 16,000,000 to 20,000,000 acres of as fine land as ever lay out of doors, and to-day men out there are growing wheat, oats, barley, and peas equally as good as we are in Southern Ontario. When I tell you that thirteen or fourteen years ago a farmer went up to New Liskeard and secured 160 acres of land and now it is all cleared up, and he was offered $15,000 for it this year, you will come to the conclusion that the land in northern Ontario is good.

It was my privilege to have a trip through Western Canada accompanied by my wife, and after leaving Winnipeg we went up into Northern Manitoba and then to Edmonton and down around by the Crow's Nest Pass, and then back straight through on the C. P. R. The first thing that struck me when I got into Northern Manitoba, Alberta and Saskatchewan was the similarity of soil and climate with our own Northern Ontario, and after all Northern Ontario is not so very far north, because when you are at Cochrane, the junction of the T. & N. O . and the G. T. P., you are still 25 miles south of the city of Winnipeg, although you are about 500 miles north of the city of Toronto. That goes to show that the clay belt is not nearly so northerly as the greater portion of the prairie Provinces, where they have such prosperity and where they are doing such marvellous work.

When I was in Edmonton I walked down with an ex-warden of our county to where the Parliament Buildings were being erected. It is almost on the spot where Fort Saskatchewan used to be, and on the banks of the Saskatchewan River, and when I saw the beautiful stone building being erected I never felt so proud of Ontario in my life. Why? Because every place where we stopped in that country from Winnipeg on, no matter where you went, north, south, east or west, the Ontario people were the people who were behind the work, and the people who were doing things. The Ontario people to-day are the great leavening influence that is going to leaven that country and make it in the future the same as the Province of Ontario—a place where we will have prosperity for all time to come, and where the British institutions will hold sway all over this northern half of the American continent. (Applause).

There is a great deal in the air to-day about reciprocity, and a great many people think reciprocity a panacea for all ills. I think our people will be well advised to be careful before they commit themselves to any project of reciprocity without knowing what the end will be. We are a great people to-day. We are only eight millions, but since the days of ancient Greece there has never been eight millions of people who have done such great things as the people of Canada have done. Where is there a community of eight millions of people where they have built three transcontinental roads whose great rails of steel reach from the Atlantic to the Pacific? Where are there eight millions of people who are as wealthy and

as prosperous, man for man, as the people of Canada? How was that prosperity brought about? Why is it we are so happy and contented in Ontario and throughout Canada to-day? What happened many years ago when the old reciprocity treaty was abrogated by the Americans, when they said we do not want your trade and they commenced to build up a barrier against us. Then Sir John Macdonald evolved a scheme, known as the National Policy, and went before the people in 1878, was elected to power, and brought into effect the National Policy. And although that policy has been changed, yet after all it is practically the same policy, and although Liberals have been in power for fifteen years they have continued that policy of "Canada for the Canadians," and we have a great home market, and we are giving our own people the benefit of the work in which they are engaged. (Applause.)

I am a farmer like yourselves, and never did a day's work at anything else in my life, and therefore I say that before we farmers commit ourselves to reciprocity we should ask ourselves what will become of our home market? When you come to consider everything you will find that there are 75 or 80 per cent of our products consumed by the people who live in the towns and cities of Ontario, and only 25 per cent of the products of the farm are exported. That being so, you should ask yourselves which is the more important market. There are no farmers who have given a moment's thought of the question but will say the home market is the most important market for him; because when you go to foreign markets you have got to compete in that market with the strongest competition. We have a splendid market for our products in the British Isles, and remember also that we have a duty to perform. We are a great country, but we must remember the flag that has braved a thousand years the battle and the breeze, that grand old Union Jack that floats to-day over millions of people who call themselves Britishers, and that flag is not continuing to float over Canada without some great sacrifices on her part. In 1812 a few Canadians met the American invaders, and the monument of General Brock at Queenston Heights stands there as a reminder of the heroism of men in those days, and we should never forget the heroism of Laura Secord. (Great applause.) Then in 1837 we had our own battles, and in 1866 we had to defend our shores against invaders, and in 1885 many of our best young men shed their blood upon the prairies of the Great North-West. What for? In order that this country, from the Atlantic to the Pacific, should be one great confederation and grow up into a British Canadian Federation and a British Empire. (Applause.) Are we not proud of our ancestors? Are we not proud of the deeds of our fathers? And why should we make an effort towards reciprocity? Is it our fault that we are not trading with America to-day? If we had ill-treated the American people it would be a different thing. We never said to the Americans we do not want to trade with you. It was the Americans who stopped trading with us. Some of the best men and some of the greatest minds we have in Canada have expressed themselves in public addresses as being opposed to reciprocity, and that being the case we ought to fairly consider what we are doing before we commit ourselves to a project of this sort.

A short time ago at a Board of Trade luncheon at the city of Toronto, Sir George W. Ross, who was for thirty years a public servant of the Province of Ontario, and for some years Prime Minister, discussed reciprocity, and he came out flat-footed against it and he gave his reasons. And the night before last Hon. Clifford Sifton, Chairman of the great Conservation Commission, that was organized by the Dominion Government, a former member of the Sir Wilfrid Laurier

Government, came out and decried any movement towards reciprocity, and Senator McMullen, who some years ago was one of the strongest advocates for reciprocity there was in Canada, is out to-day against reciprocity.

If the Americans want reciprocity, they have 42 bars against us and we have only 27 against them. They can take down their bars until they number 27, and then we will be in a position to talk. (Applause.) But when the tariffs are so high as they are against us, and with the balance of trade against us for the last 20 years, I see no reason why we should enter into a treaty. You know what I think about it. I have never made any bones about it. I am opposed to reciprocity, but I do not ask other people to be opposed. What I ask them to do is to think carefully and to weigh the matter carefully in their minds. Remember you cannot change our tariff in any direction without more or less disturbing it in another direction, and the position that we occupy to-day is in many respects the outcome of the tariff we have. I think the best the Canadians can do now that we have become a great commonwealth is to hew out our own destiny as best we can, and let our American cousins—and we bid them Godspeed, and we are glad to see the work they are doing in the civilization of the world—do the same as we are doing. Let these two great English-speaking nations remain as they are, and we will go on banded to the old British Isles, the Australian Colonies and the millions of India, walking hand-in-hand in the work of civilizing the world, and doing that which is best from our point of view, and at the same time living in peace and good-will with our neighbors to the south; but each doing their work in their own way and according to the system that suits them best. (Loud applause.)

REPORT OF COMPETITIONS OF CHEESE AND BUTTER.

Prize List.

	Total Score.
September White Cheese—	
1st Prize, B. F. Howes, Attwood	96.88
2nd " H. Donnelly, Straffordville	96.33
3rd " R. A. Thompson, Attwood	96.16
4th " (tie) C. Klockman, Carthage, and C. A. Barber, Woodstock	95.82
September Colored Cheese—	
1st Prize, J. E. Stedelbauer, Listowel	95.99
2nd " Jno Cuthbertson, Sebringville	95.65
3rd " C. J. Donnelly, Scottsville (preference for flavor)	95.49
4th " C. A. Barber, Woodstock	95.49
October White Cheese—	
1st Prize, J. K. Brown, Ethel	95.98
2nd " C. J. Donnelly, Scottsville (preference for flavor)	95.66
3rd " R. A. Thompson, Attwood	95.66
4th " A. E. Shapland, White Oak	95.49
October Colored Cheese—	
1st Prize, R. A. Treleaven, Rothsay	95.82
2nd " Peter Callan, Woodstock (preference for flavor)	95.66
3rd " Geo. Cameron, York	95.66
5th. " R. A. Thompson, Attwood	95.49
56-*lb. Box, Winter Creamery Butter—*	
1st Prize, Jno. Cuthbertson, Sebringville	95.66
2nd " R. A. Thompson, Attwood	95.49
3rd. " T. J. Humphrey, Avonbank	95.33
4th " Hugh Patrick, St. Thomas	95.32

	Total Score.
20 1-*lb Prints. Creamery Butter*—	
1st Prize, J. A. Waddell, Kerwood (preference for flavor)	96.16
2nd " R. A. Thompson, Attwood	96.16
3rd " E. M. Johnson, Innerkip	95.32
56-*lb. Box. October Creamery Butter*—	
1st Prize, Geo. Medd, Winchelsea	95.82
2nd " W. H. Brubacker, Dresden	95.40
3rd " Hugh Patrick, St. Thomas (preference for flavor)	95.32
4th " J. A. Waddell, Kerwood	95.32
10-*lb. Stilton Cheese*—	
1st Prize, R. A. Thompson, Attwood	95.66
2nd " Peter Callan, Woodstock	95.49

Special Prizes.

By the Heller & Merz Co., 22 Cliff St., New York: To the buttermaker securing the highest score on butter in Classes III and IV, colored with Alderney Butter Color, $10 in cash.—J. A. Waddell, Kerwood, and R. A. Thompson, Attwood (tie).

To the buttermaker securing the second highest score on butter in Classes III and IV, colored with Alderney Butter Color, $5.00 in Cash.—C. Richardson & Co., St. Marys, Canadian Agents for Alderney Butter Color.

By the R. M. Ballantyne, Limited, Stratford, Ont., for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Rennet Extract to the cheesemaker securing the highest score on September White Cheese, Class I, Sec. 1.—B. F. Howes, Attwood.

One case of Hansen's Cheese Color to the cheesemaker securing the highest score on October Colored Cheese, Class II, Sec. 2.—R. A. Treleaven, Rothsay.

By C. H. Slawson & Co., Ingersoll, for D. H. Burrell & Co., Little Falls, N.Y., manufacturers of Chr. Hansen's Rennet Extract and Color: One case of Hansen's Cheese Color to the Cheesemaker securing the highest score on September Colored Cheese, Class I, Sec. 2.—Jno. Cuthbertson, Sebringville.

One case of Hansen's Rennet Extract to the Cheesemaker securing the highest score on October White Cheese, Class II, Sec. 1.—C. J. Donnelly, Scottsville.

Note.—All cheese competing for the special prizes offered by the R. M. Ballantyne, Limited, and C. H. Slawson & Co., must be made with Hansen's Extract and Color. No special cheese required.

By the J. B. Ford Co., Wyandotte, Mich., manufacturers of Dairymen's Cleaner and Cleanser: A handsome set of Military Brushes, with heavy quadruple silver-plated backs and silver-mounted comb to the Cheesemaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the best finished and most stylish-looking cheese on exhibition.—C. A. Barber, Woodstock.

A handsome set of Military Brushes, with heavy quadruple silver-plated backs, and silver-mounted comb to the Buttermaker who is a regular user of Wyandotte Dairymen's Cleaner and Cleanser, having the neatest and most attractive exhibit of butter.—Hugh Patrick, St. Thomas.

Note.—All exhibits (except Stilton Cheese) are eligible for these two special prizes.

By the Canadian Salt Co., Windsor, Ont., E. G. Henderson, Manager: $30 in cash to the Buttermaker securing the highest score on butter exhibited in any class.—J. A. Waddell and R. A. Thompson (tie).

$20 in cash to the Buttermaker securing the second highest score on butter exhibited in any class.

Note.—No special butter required.

By the Western Salt Co., Mooretown, Ont., N. A. Leach, Manager: One barrel Purity Cheese Salt to the Cheesemaker securing the highest score on September White Cheese, Class I, Sec. 1.—B. F. Howes

One barrel Purity Cheese Salt to the Cheesemaker securing the highest score on October Colored Cheese, Class II, Sec. 2.—R. A. Treleaven.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on fifty-six pound box Creamery Butter, Classes III and IV, Sec. 1.—W. G. Medd, Winchelsea.

One barrel Purity Dairy Salt to the Buttermaker securing the highest score on twenty one-pound Creamery prints, Class III, Sec. 2.—J. A. Waddell and R. A. Thompson.

Note.—No special butter or cheese required.

By C. C. James, Deputy Minister of Agriculture for Ontario: $6.00 in cash to the Cheesemaker securing the highest score on three Stilton Cheese exhibited in Class V.—R. A. Thompson.

$4.00 in cash to the Cheesemaker securing the second highest score on three Stilton Cheese exhibited in Class V.—Peter Callan.

By the Marshall Dairy Laboratory, Madison, Wis.: A handsome Gold Watch, value $25.00, to the Cheesemaker securing the highest score on Cheese (except Stiltons) made with Marshall's Rennet. Robert Johnson, Woodstock, Ont., Canadian agent for Marshall's Rennet and Color.—J. E. Stedelbauer, Listowel.

By the Imperial Bank of Canada: A Silver Cup, to become the property of the Cheesemaker securing the highest total score, three times, or twice in succession, on two cheese; one cheese either white or colored, exhibited in Class I, and one cheese either white or colored, exhibited in Class II. In awarding this cup the scores of the two cheese securing the highest score in Classes I and II (belonging to the same exhibitor) will be added. In case of a tie, settlement is to be left with the judges.—R. A. Thompson.

Note.—No special cheese required.

Cheese Buyer's Trophy—Challenge Cup, valued at $150, to become the property of the exhibitor of cheese (except Stilton) at the Winter Dairy Exhibition who shall receive the highest score three times, or twice in succession.—B. F. Howes.

Won 1903 by Frank Boyes; won 1904 by R. H. Green; won 1905 by O. Schwietzer; won 1906 by J. Patton; won 1907 by J. E. Stedelbauer; won 1908 by Mary Morrison; won 1909 by J. T. Donnelly; won 1910 by Mary Morrison.

Note.—Cheese without a bandage will be considered unfinished, and shall be scored off for finish accordingly.

Cheese on exhibition may be paraffined.

All one-pound print butter on exhibition must be wrapped in plain wrappers.

The Chairman: You have heard the report of the judges of our dairy exhibit. There is one thing that I am sure every one here must feel proud of, and that is the magnificent display we have at our exhibition this year. We have always had a good exhibit, but I think the one this year excels anything we have ever had before. I have not had the pleasure of seeing any of the cheese bored, but from the appearance it excels anything I have yet seen. It is an inspiration to look at the cheese as they stand upon the shelves. You can almost take a straight edge and lay it on top of them and touch every cheese. They are models of perfection in the matter of finish, and the cheese makers are to be congratulated.

REPORT OF CHIEF DAIRY INSTRUCTOR AND SANITARY INSPECTOR FOR WESTERN ONTARIO.

Frank Herns, London.

Cheese Factories.

It is with pleasure I present my fourth annual report as Chief Dairy Instructor and Sanitary Inspector. There was very little change in the method of instruction from that of the previous year. Two of the cheese instructors were not available, and the men engaged to fill these positions have given satisfactory proof of ability and indicate that good judgment was exercised in their selection. Six instructors were employed for cheese factories and two for creamery work. The usual April short course at the O. A. C., Guelph, was attended by the instructors and much appreciated.

Quality of Cheese.

The quality up to the end of June was exceptionally fine. When warm weather came many of the usual difficulties had to be contended with. Some rough textured open cheese were reported and the quality of a few factories fell off. Over-ripe, gassy milk and warm curing rooms are to be blamed for many of

the defects in our summer cheese, together with some faulty methods of making. Some of the makers get alarmed when warm weather appears, and thinking to protect themselves from open cheese use more salt than is necessary. Very few acidy cheese were reported. The fall cheese were generally speaking of good quality. On the whole, bad flavors have been less pronounced and less difficulty encountered with small round holes, a defect formerly quite prevalent in some of the summer cheese. Little complaint has been heard regarding boxing, and some improvement has been noticed in curing the late fall cheese. There is still some complaint with respect to the finish of the cheese. On the whole, however, we believe some progress has been made.

Quantity of Cheese.

We made in Western Ontario in 1909, 17,883 tons of cheese, which is equal to 447,075 boxes of 80 lbs. each. This is 661 tons or 16,525 boxes more than in 1908. The returns for 1910 will not be in until June next, but the Instructors report 105 factories making more cheese, 55 less, and 29 the same as in 1909, so that probabilities point to a considerable increase for 1910. The average yield (pounds of milk to make a pound of cheese) in 1908 was 11.083, in 1909, 11.09. The net prices to patrons in 1909 was 11.42 cts. per pound cheese.

Average Temperature of Curing Room.

May, 59; June, 66; July, 70; August, 71; September, 60; October, 56. These temperatures do not include cool curing rooms. It will be seen that the average temperatures for July and August are far too high to get proper results in curing finest cheese. In fact a great many of our summer cheese show defects through being subjected to too high a temperature. Cool curing rooms are the solution of this problem.

The Milk Supply.

Fifteen thousand and seventy-five patrons sent milk to the 205 cheese factories. This is 1,910 less than last year. The average per cent. of fat in the milk for season was 3.5 per cent., practically the same as the past three years. May, 3.3 per cent.; June, 3.4 per cent.; July, 3.4 per cent.; August, 3.5 per cent.; September, 3.6 per cent.; October, 3.8 per cent.

The average loss of fat in the whey for season was .21 per cent. This is .01 per cent. less than last year. May, .21 per cent.; June, .2 per cent.; July, .21 per cent.; August, .23 per cent.; September, .22 per cent.; October, .23 per cent.

The condition of the milk showed improvement, but the great difficulty seems to be to get all the patrons to realize that when warm weather comes a special effort should be made to cool the milk. This is coming slowly. The percentage of poor cheese is gradually being lessened, and we now have the majority of defective cheese confined to the two warm months of July and August. If the patrons will all cool the milk, particularly during these two months, immediate improvement will be shown.

Bitter and Fruity Flavors.

The season of 1910 seemed favorable for a prolific growth of yeasts. We are convinced that had the growth of these organisms not been checked to some extent

through the pasteurization of whey a great many factories would have had as much trouble as in the years previous to 1907 when a large percentage of the factories were troubled with these flavors. Where pasteurization was properly practised the bitter flavor was kept under control, and in most cases gave very little trouble. When we remember that only a few years ago a large number of our cheese were injured through this flavor and that the loss on fruity flavored cheese is stated by buyers to be anywhere from ⅛ to ½ ct. per lb. of cheese, this question becomes important. If through pasteurization of whey we can eliminate even a percentage of fruity and whey flavors it means dollars saved as well as improvement in quality. We have to continually fight this flavor through pasteurization of whey, weeding out rusty cans, immediately looking after the milk of those patrons which show this flavor, and see that the cans are properly washed and the milk well cooled. Not only has the reputation of our cheese to be considered but also the loss from cuts in price at the individual factories. When the flavor developed at factories where the whey was not pasteurized it was very persistent and difficult to deal with, as it was hard to locate many of the offending patrons since numbers of the cans were infected through the whey. The flavor was occasionally noticed at a few factories where the whey was apparently well heated, but only for a short time and on an occasional curd. The patron whose milk showed the flavor was easily located by the curd test. After a visit to the farm the trouble usually ceased. The organisms were not so easily spread through the cans. At two or three factories, during the early part of the season, where the whey was heated for the first time the flavor appeared. The reason no doubt was that with a small quantity of whey in cool weather the temperature went down too quickly. Had pasteurization been continued the trouble would have probably disappeared.

Pasteurization of Whey and Whey Tanks.

One hundred factories pasteurized the whey. Seventeen fed the whey at the factories, leaving 88 factories not pasteurizing the whey. The average per cent. of fat was .2, the average acidity, .38 per cent., and the average temperature 116 degrees, of the whey returned in the patron's cans, where properly pasteurized. The average per cent. of fat was .11 per cent., the average acidity, 1.09 per cent., and the average temperature 86 degrees of the whey returned in the patron's cans not pasteurized. These figures are nearly all the same as last year.

About the same proportion of factories as in 1909 did a first-class job in the pasteurization of whey. The factories which were behind in this connection showed about the same reasons for partial failure as mentioned last year. Too much whey left over in the tank, improper equipment, lack of sewage disposal, and in some cases plain carelessness. Continued satisfaction is expressed by the patrons with respect to this work.

An improvement was shown in the condition of the tanks where the whey was not pasteurized; they, in the majority of cases, were cleaned more frequently, and an effort made to return cleaner and sweeter whey. The agitation for better whey is doing good even where the whey is not pasteurized. With respect to feeding value of pasteurized whey, it is noticed it contains about twice as much fat as ordinary factory whey. Pasteurized whey therefore should be from 12 to 16 per cent. greater in feeding value from extra fat alone, based on recent experiments which state a difference in feeding value of 25 per cent to 33 per cent. in favor of unskimmed sweet whey.

Experimental Cheese.

Through the Bacteriological Department, with the assistance of the Dairy School at the O. A. C., cheese were made, samples of which are shown at the winter exhibition. Cultures of yeast have been introduced, the originals of which were taken from a number of Western Ontario factories from unpasteurized whey. In many of these cheese the characteristic fruity flavor has developed, and the texture is injured, while the control sample is comparatively clean in flavor. This points out that the organisms that produce fruity flavors are present in the whey. If, through pasteurization, they can be checked to some extent at least, and also disease germs destroyed, the system should be encouraged by all dairymen. The makers are requested to examine the experimental cheese. A bacteriological exhibit is also shown which graphically illustrates the effect in milk of different bacteria, and points out the necessity for cooling and cleanliness at all times in the production of milk.

Sewage Disposal.

A few more factories installed septic tanks for the disposal of factory sewage. Full information respecting the construction and working of these tanks will be found in the 28th Annual Report of the Provincial Board of Health. It is expected this information will be printed in bulletin form so that it can be available for those who wish to put in this system.

Not to weary you with a detailed statement I have made out a form, giving the work of the Instructors for the season. It will be noticed that only nine factories are making whey butter, 10 making casein, 27 pay by test (four more than last year), 23 have cool curing rooms, (two more than last year), 583 patrons were visited (273 more than last year), two new factories were built, and there was a total expenditure for improvements of $19,760.

Data on Herds and Milk Production.

The accompanying table gives some data relative to the average production for six months of herds furnishing milk to cheese factories in Western Ontario in 1910. The records were obtained through the co-operation of the Instructors with the makers, patrons and Secretaries of 17 factories. It is difficult to appreciate the obstacles that arise in collecting this data. However the figures we have to present we think are fairly accurate. We fully recognize the importance of knowing the cost of production and had we been able to secure data on this point the value of these records would have been much greater. Could we have shown the production for the full milking period the averages would have been higher. but from the factory standpoint six months is about the time the patrons get cheese prices for milk.

HERD RECORDS, MAY 1—OCT. 31, 1910. 17 FACTORIES, WESTERN ONTARIO, 6 GROUPS.

Group.	Factory No.	No. of Herds.	Total Cows.	Herd, Average lbs. milk per cow.			No. Herds averaging lbs. milk per cow.				
				Average.	Highest.	Lowest.	Less than 3,000	3,000 to 4,000	4,000 to 5,000	5,000 to 6,000	Above 6,000
I.....	1	50	679	3,872	6,105	2,752	3	32	13	1	1
	2	48	604	4,056	6,245	2,754	1	25	20	1	1
	3	50	600	3,805	6,012	2,264	5	27	15	2	1
		148	1,883	3,911	6,120	2,590	9	84	48	4	3
II.....	4	50	463	4,135	5,923	2,650	2	22	19	7	0
	5	50	642	3,572	4,737	2,141	13	23	14	0	0
	6	50	452	2,976	4,629	1,510	26	19	5	0	0
		150	1,557	3,561	5,096	2,100	41	64	38	7	0
III.....	7	42	476	3,592	5,251	2,389	10	20	11	1	0
	8	27	431	4,429	6,451	3,175	0	10	13	3	1
	9	42	474	4,288	5,888	2,764	1	14	22	5	0
		111	1,381	4,103	5,863	2,776	11	44	46	9	1
IV.....	10	50	538	3,923	6,299	2,461	3	28	15	3	1
	11	47	405	4,274	5,670	2,502	5	19	20	3	0
	12	47	417	4,076	5,989	2,628	7	21	10	9	0
		144	1,360	4,091	5,986	2,531	15	68	45	15	1
V.....	13	44	656	4,334	5,821	2,978	1	16	19	8	0
	14	40	421	4,657	5,683	3,611	0	3	28	9	0
	15	21	158	4,356	5,635	3,279	0	8	7	6	0
		105	1,235	4,449	5,713	3,289	1	27	54	23	0
VI.....	16	50	363	3,653	5,027	2,957	4	32	13	1	0
	17	50	358	4,192	5,447	2,757	2	24	19	5	0
		100	721	3,922	5,237	2,857	6	56	32	6	0
Totals..		758	8,137	4,006	5,669	2,690	11 % 83	45 % 343	34 % 263	8 % 64	.6% 5

We took three factories in each instruction group except one, and it was intended to take fifty patrons from each factory, but in some cases we found it difficult to secure records sufficiently accurate from that number, therefore only those we considered gave a fairly correct record were taken. The weight of milk was secured from the factory books. The Instructors visited many of the farms, and with the assistance of the maker and secretary, as close figures as possible were obtained. I wish to express appreciation of the work of those who gave assistance.

Assuming the cost of production to be nearly the same what would the price of cheese need to be that the herd averaging 2,690 lbs. would make a profit equal to those averaging 5,000 to 6,000 lbs.—in the latter case cheese worth 10½ cts. per lb.—or what difference in the cost of production would be necessary to make these herds equal in profit? Also note that while the average per herd is fairly good, how few herds reach 6,000 pounds. This is one great problem in the dairy industry and we hope to get patrons and makers to take a greater interest in keeping records of herds through cow-testing associations and in other ways.

The 6,000 lb. cow with milk at 85 cts. per 100 lbs. would amount to $51.00, while the 3,000 lb. cow would be only $25.50.

We fully appreciate the advantage to be gained by an increase in the price of cheese, yet we feel that it is not entirely the price of cheese that controls the profit but the production from the individual cow. Too many of us are inclined to centre our opinion of profit on the extra price, apparently losing sight of the importance of the *extra milk.*

Value of Demonstration.

It is generally admitted that demonstration is of more value in persuading a man to adopt different methods than merely telling or writing him how. Spoken or written information through meetings, lectures, the press, bulletins, circular letters and leaflets are of immense value, in instructing patrons how to care for milk and cream. There are, however, a class of patrons who do not seem to absorb this information, or if they take heed the evidence is not forthcoming. There is another kind of patron who, although admitting the necessity for better methods of caring for milk, carelessly allows things to go on pretty much as they were, simply because he has not been stimulated to the point where he really gets at the actual work of laying plans for a different system. He is simply drifting along in the old rut, intending some day to build a little tank or milk house, but the "some day" still remains in the far distant future. These kind of men seem to require something more tangible brought to their notice than written or spoken information, and it has suggested itself to us, that perhaps if this information could be supplemented by actually showing him how to care for milk in the simplest, most time-saving way he might be reached. It is only within the past few years that actual demonstration could be relied on to give real solid information and the results terminate in actual proof of accuracy. We now believe that cooling milk is the best method to preserve it, so that any demonstration in the care of milk to-day will be fairly uniform, and yet meet the views of most cheese makers. Previous to the time mentioned, any demonstration in the care of milk would certainly not have been uniform, as one cheesemaker would have insisted that his patrons aerate the milk and endeavored to sell him a patented aerator. Another wanted the milk dipped, another stirred only, another aerated and cooled, another dipped and cooled, so it can readily be seen that after many years of education along these lines this lack of uniformity is to some extent responsible for many patrons hesitating to adopt cooling only. We have now agreed that cleanliness and quick cooling of the milk is required, then would it not be a good plan for each cheese factory to install a model tank either of wood or cement, and fit it up simply for the introduction of cold water. When a patron's milk arrives at the factory over-ripe or in such other condition that the cheesemaker is certain proper cooling will remedy, then if the patron draws his own milk show him how he can fit up a similar tank and follow your suggestion. Explain the effect on the factory operations of taking in over-ripe and gassy milk, and how this can almost be remedied by proper cooling. If necessary, take a can, fill it with the same amount of water as he sends milk at 98 degrees, then with cold water and a thermometer show how few movements are required; how quickly the temperature is lowered, how many times the warm water is to be drawn off and replaced by cold, and how much or how little stirring the milk needs. Put the lid on the can at the right time and show in what condition everything should be left for the night. Make everything so simple, and the operations so few, that he will be surprised how little effort is required to properly cool milk if the necessary apparatus is at hand and every move made to count. Show him how, and the necessity for using a thermometer, a brush for washing the can, and have these on hand for sale at cost.

After you have him interested go out to the farm or have the Instructor do so, and follow him up until he is satisfied the new system is a success. If the patron does not bring his own milk send him a note asking him to call at the factory and show him how to cool the milk. Follow this up tactfully, and see if many of these patrons will not improve. Would it not pay the average factory to go even further, build a cheap model milk house, install a tank, have plans of this tank, milk house and can lifter, together with an estimate of the cost, that can be given the patron at a moment's notice.

Now this would not work a revolution and might be disappointing for some time, but if some practical way of demonstrating how easily this milk can be taken care of and at what small cost, can be shown the patron, it would be a means, through the eye, of getting them interested. We believe that cooling milk is right, let us back it up by actually showing the patrons how to do it, so there can be no possible mistake, misunderstanding, or excuse on their part.

True, there are many patrons who know how but neglect to put into practice what they know. If this demonstration outfit were made a part of the factory equipment, showing it has the approval of the factory managers, then it becomes an educator from year to year, and is finally adopted as part of the producer's every-day operations, making for stability and uniformity, not a haphazard education.

Annual and District Meetings.

Since November 1st, 1909, to October 31st, 1910, seven district meetings, attendance, 174; 11 Farmers' Club Meetings, attendance 895; 12 Special Dairy Meetings, attendance, 1,255; 3 special Fruit and Dairy Meetings, attendance, 205, 127 Annual Meetings of factories, attendance, 7,635, were held, making a total of 160 meetings and a total attendance of 10,164. In this way we have reached a large number of milk producers.

Moisture in Cheese.

During the past season the Instructors sent to the Dairy School, O. A. C., 22 samples of curd, green and ripe cheese for moisture determination. The average moisture content of the curd was 42.306 per cent., of the green cheese, 34.664 per cent., of the ripe cheese, 34.638 per cent., as reported by Prof. Dean.

Memoranda of Prosecutions, 1910.

The system adopted in 1907 for handling cases of adulteration of milk by employing a special officer was continued again this year. Only 27 patrons were prosecuted; each appeared before a magistrate, acknowledged the offence and paid fines ranging from $10.00 to $30.00. Half of this money went to the different factories where the offence was committed to partially reimburse the patrons. The other half of the fines went to the Association to help pay the expenses of this work. This year the Association is in debt to this work $156.50. We find that the system is doing away with cases of deterioration since, in 1907, 60 patrons were prosecuted, while this year there were 33 less. It is to be hoped that in future little of this kind of fraud will be found, but until factories adopt payment by test we see no other way of handling this work.

District Meeting, 1910.

Instead of having the usual district meetings this year in each group, one central meeting, held at the Guelph Dairy School, during the Winter Fair, was tried. The attendance was good, and a live interest was taken in the subjects brought up for discussion. The discussions will no doubt be published in some form so that they will be available for everyone interested.

I wish to express sincere appreciation of the work of the Dairy Instructors during the past season, and thank the Directors of the Dairymen's Association, the makers, buyers, and all the Dairymen for their kindness to me.

Mr. Barr: Those are figures of the average herd?

Mr. Herns: They are the herd averages per cow, average, highest and lowest.

Q.—One cow of a herd or all of the herd?

A.—Those are the average cows of the herd.

Q.—You say that is the best cow of those fifty herds?

A.—That is the best average cow in the fifty herds, and the lowest average cow in the fifty herds.

Mr. Burgess: Do you know anything about the time those cows freshened?

Mr. Herns: No, we have no data on that point.

The Chairman: I am sure you have all been delighted with the report Mr. Herns has given us. He has thrown out one thought that is worthy of extra consideration, and that is the idea of making some practical demonstrations to the patrons at the factory on the cooling of milk. We find very often that the men you want most at the meeting do not attend. It is the same with our convention; the man we want most is not here.

Mr. Putnam: I would like to ask Mr. Herns if he took these returns from records of the individual cow?

Mr. Herns: No; we simply divided the total lbs. of milk by the total cows.

Q.—You do not know what each cow gave?

A.—No; we had to divide the total milk by the number of cows so that it is the herd average production per cow.

LOSSES IN MAKING CHEESE FROM OVER-RIPE MILK.

Prof. Robert Harcourt, O. A. C., Guelph.

The work done in 1909 was carried out in co-operation with six cheese factories. Samples of the normal and over-ripe milk and the cheese made from each, together with the weight of milk in each vat and the weight of cheese made in each case were taken and sent to us. Fat and protein were determined in both milk and cheese and the difference between that recovered in the cheese and that found in the milk charged as loss. The average losses per 100 pounds of milk are given below:

——	Protein.	Fat.	Moisture.	Cheese.
	lbs.	lbs.	lbs.	lbs.
Normal milk	.735	.338	.....	9.17
Over-ripe milk	.778	.337	.....	8.31
	.043	.....	.....	.86

The work done in 1910 was with small vats (700 lbs.), where all the work was carried out as accurately as we possibly could. Naturally, in dealing with a smaller amount of milk it was possible to control conditions after dipping better than in a large factory.

——	Protein.	Fat.	Moisture.	Cheese.
	lbs.	lbs.	lbs.	lbs.
Normal milk	.803	.529	3.11	9.04
Over-ripe milk	.832	.664	2.92	8.79
	.027	.035	.19	.25

Loss of protein as influenced by acidity:

.17	per cent.	acid in	whey	gave	.937	per cent. soluble	protein.
.175	"	"	"		.947	" "	"
.23	"	"	"		1.072	" "	"
.25	"	"	"		1.118	" "	"
.27	"	"	"		1.126	" "	"

The object of the work in the first place was to try to determine where the loss occurred in making cheese from over ripe milk. You are all well aware, of course, that there is a loss, and the problem set me was to try and find out what the loss consisted of.

Let me say in the first place that milk is made up of the water, proteins (meaning both casein and albumen), and the fat and the ash and the sugar. Of these we get into the cheese practically only three, in any large quantities that we will deal with here: the protein and the fat and the water. Of course, there is some sugar in the green cheese, but none in the cheese when it becomes older. There is some of the ash. We did not follow the ash to try and find whether there was any difference in that; we worked principally upon the main constituents, protein and fat and the water. The first work that we did on that was in connection with our own dairy in small vats, making up three or four hundred pounds of milk.

Our plan was to make the cheese and recover all of the whey, and analyze the whey to find out whether there was a larger amount of protein and fat in the whey from the over-ripe milk than there was in the whey from the normal milk. We found that sometimes there was a greater loss from the normal milk than from the over-ripe, and sometimes a greater loss of protein from the over-ripe than from the normal; and after working on that for some time we found we had accomplished nothing—that we did not know any more about where the losses were than when we started.

Then, after consulting with Mr. Herns, we decided to carry the problem to the cheeese factory. It was impossible to collect and weigh the amount of whey from each of the vats so as to get at the amount of loss in the whey, and we had to turn to the other side. We selected some six or seven factories, and asked these cheesemakers when they got an over-ripe vat of milk to take a sample of that milk, and also a sample from one of their other vats that was normal, and to send samples of the two vats, and also to send us the weight of the milk that was in the vat. Then we were able to calculate from that composition how much protein and how much fat there was in the milk that was in that vat. The next morning when the cheese were being turned in the press we asked them to take a plug out of the cheese from that vat and furnish us with it for a sample. We then analyzed this and from the weight of the cheese we were able to calculate the amount of proteids

and fat that were recovered in the cheese. And we were able to get at the loss in that way. The first table given on the chart shows the result of that work. We had some 52 samples of normal and over-ripe milk worked out to get these averages, and we found for every one hundred lbs. of milk on an average there was .75 lb. of casein or proteids less in the cheese than there was in the milk. From the over-ripe milk we found .778 lbs. per one hundred lbs. of milk. The figures stand almost the same in the fat. We did not determine the moisture in the cheese, we do not know the difference in the moisture of the cheese from over-ripe milk and from the normal milk. When we came to figure this up we found that we had a loss of cheese of .86 lbs. per one hundred lbs. of milk, and we could only account for .043 lbs. in the proteids, so that we were just about as badly off as ever.

We found that in some cases the over-ripe milk, by figures that had been furnished us, would actually give more cheese than the normal milk. We found in some cases that the loss in the proteids was greater from normal milk than from over-ripe milk, and we came to the conclusion that in weighing in comparatively small quantities of milk to make up 5,000 lbs. errors had crept in in the weights, and although the weights of the cheese that were given us might be accurate enough for general purposes, they were not accurate enough for scientific research. When I was asked to report on this last year, I did not do so because I felt that I wanted to give more study to the subject.

The past year we went back to our experiments, and we commenced taking 700 lbs. vats of milk, and found the same thing as we found before. Sometimes it was up and sometimes it was down. Then we found that possibly there was an error or inaccuracy in the weighing. If you weigh in ten lots of milk and give a down weight in every one of them you have got more than 700 lbs. and so we took all the milk that was to go into the vat into one can, and we weighed it all at once and got at the products from that and that gave us the figures which you have in the second part of the chart and these figures we have here are the average of the number of trials: We find that we have got a loss of .27 lbs. of protein and .035 lbs. of fat, .19 lbs. of moisture one hundred pounds of milk, and if you double these three they give you almost identically the difference we get in the cheese, .25. Then we lost a quarter of a pound of cheese per one hundred lbs. of milk as a result of having that milk over-ripe, and it is accounted for almost entirely by these three factors. The milk was all weighed at once and the cheese all weighed at once and the products were stated as correctly as they possibly could get them and I think this shows where the losses occurred. The cheese made from over-ripe milk where there is a higher acid will contain less water, and according to these figures the largest difference in the loss is due to the difference in the moisture content of these cheese. The cheese were dryer. That is not a big percentage to account for the difference in the cheese.

Then we return to the other side of the question. In what way does the higher acid affect the different constituents of the milk? It is known to all those who are dealing with protein material that they are always brought into a solution by the action of acid. I do not care whether it is the white of an egg, or casein, or what it may be, if you put it in contact with acid it will gradually go into a solution; and so it has always occurred to me that it is natural to expect that if one lot of casein is in contact with a lot of higher acid than another one there must be some of the casein material go into solution, and that would account for the loss of this material.

To bring that point out a little more clearly, I have given you the figures at the time of dipping .17 acid in whey gives us .937. Ten minutes later in another

curd of the same milk acid .175 gives us .947. That was one experiment. In another experiment .23 acid in whey at the time of dipping we got a loss of 1.072, and in ten minutes that acid rose to .25. We then got a loss in the whey of 1.118, and ten minutes later when the acid rose to .27 we got a loss in the whey of 1.126. If you look back to the other figures where we had a lower acidity of the normal milk there we find .803 higher acid, and the longer the time it has to act on the curd the greater the loss of the proteid materials. There is a softening and there is a solution of the casein, and along with that there is also associated a liberation of fat, and therefore the cheese is dryer, accounting for that loss. So that we have as a result of the work we have done on this question to place the loss in weight, principally in the difference in the moisture content of the cheese, but associated with that some of the proteids and some of the fat. These are the results as we found them.

Mr. Barr: Was the acidity of this milk in the last group exactly the same in all cases?

A.—Those were individual results .23, .25, .27. The acidity of the milk was exactly the same when we set them.

Q.—That is just the acid in the whey.

A.—That is a point that I am glad you brought up. One lot of milk was divided into two, and both set with the rennet and one dipped when the acidity was in the whey .17 and the other dipped when the acid was .175. I do not think the loss under these circumstances would be as great as if there was a difference in the acidity of the milk at the time of setting; because the higher acidity had already commenced to work on the different constituents, so that if we have two lots of milk brought to the factory one higher in acidity than the other, I think it is natural to say that the proteids have already been acted upon by acid and the loss would be greater.

Mr. Parsons: That is a quarter of a pound of cheese less. Is that in the green cheese?

A.—Yes.

Q.—Was the cheese followed up to a later period to see whether it gets dryer?

A.—No, they were not followed to see what the effect would be upon them. Mr. McKay made the cheese that were used in this experiment, and I do not know whether he knows anything about their after condition or not. (Applause.)

EXPERIMENTS IN CHEESEMAKING, 1910.

Alex. McKay, O. A. C., Guelph.

In this paper it will be possible for me to deal only very briefly with a few of the experiments conducted at the Dairy department of the College during the past season, as in explaining experimental work of any kind we are compelled to deal with a large number of figures which tend to make any address uninteresting. However, I will present a few of our experiments as briefly as possible, and refer you to the College report for a full report of the work done.

The milk used in this work was received from a number of farmers in the neighborhood of the College, and so it was milk similar in all respects to that received at the average factory. The average percentage of fat in the milk for the season was 3.6, and casein 2.46. The first series of experiments were : A com-

parison of different percentages of acid at the time of dipping. The milk as received was thoroughly mixed, then divided into two vats, and treated as nearly alike as possible, until the time of dipping. Then the B vat was dipped with an average acidity of .17. The A lots were held in the whey until they developed an average of .2 per cent. of acidity as determined by the alkaline test. This left the A vat much longer in the whey than was the B vat, but the period from dipping to milling was shortened to the same extent, as we wished to keep all other conditions as nearly alike as possible. When the B curd was ready to mill the A curd was also milled. We usually found that the B curd showed more acid at this time than did the A vat; also had nicer texture and general appearance. We found that the B curd or the one dipped with the least acid kept in the lead, both in respect to acid development and maturing of curd.

The average loss of fat in the whey from the A vats was .24 and from the B vats .23. The percentage of moisture retained by the cheese was slightly in favor of the B cheese or the one dipped comparatively sweet. The yield of cheese per 1,000 lbs. milk was for the A lots 91.68, for the B lots 92.41, making a difference of about ¾ of a pound of cheese in favor of dipping with the smaller amount of acid. The quality of the cheese was slightly in favor of the B lots, the score being 92.7 for the A lots and 93.02 for the B lots. Conclusions to be drawn from these experiments are that giving a large amount of acidity at dipping does not shorten the time for making cheese, other things being equal: and if it is done to any great extent it results in a reduced quality and quantity of cheese—two of the main points to be kept in view in the making of finest cheese. Of course, dipping sweet can be carried to excess, but it is quite safe to state that the closer we are able to keep to the sweet line and get our cheese close, the more and better cheese we will be able to make from a given quantity of milk.

The next series of experiments were conducted along the line of stirring compared with not stirring curds at the time of dipping, all other things being equal. The milk as delivered to our cheese department was thoroughly mixed in one large vat then divided into two smaller ones. Altogether there were used in this experiment 17,284 lbs. milk, testing an average of 3.57 per cent. fat. The average loss of fat in the whey was .22. Both vats were treated as nearly alike as possible, except that the A vat was not stirred at the time of dipping. B vats were stirred in the usual way. There was practically no difference in the rate of acid development in the two curds. The yield of cheese per 1,000 lbs. milk was:

A vats or those not stirred 92.95
B vats or those stirred 92.05

The quality of the cheese is indicated by the following score:

	Flavor. 40	Closeness. 15	Color. 15	Texture. 20	Finish. 10	Total. 100
A. Not stirred ..	35.75	13.91	14	16.86	10	90.52
B. Stirred.....	36.10	13.98	14.21	17.33	10	91.62

A difference of 1.1 points in favor of the stirred curds. This is the average of fourteen experiments.

The next series is along similar lines to the one just given, except that the milk was all made up in one vat until the time of dipping, then the curd was divided

into two equal parts, but not weighed until the time of salting. In this case A part was not stirred at all after being thrown out into the curd sink. The B part was stirred in the usual way.

There were 32 experiments conducted, using 64,687 lbs. milk, testing 3.5 per cent. fat and 2.3 per cent. casein. The smallest quantity of milk used at any one time was 1,551 lbs., and the largest quantity was 3,205 lbs. I might state here that the curds were cut with the ⅜ horizontal blade knife and the ¼ inch perpendicular wire knife, and were normal curds dipped with an average acidity of .185 milled at about .7, salted at 1. per cent. with practically no difference in the development of an acidity in each lot. There was a difference in moisture content in favor of the curds not stirred of 6.23 per cent. in the curd at dipping, in the green cheese of .42, in the cured cheese one month old of .36 per cent.

The quality as determined by the score was:

——	Flavor. 40	Closeness. 15	Color. 15	Texture. 20	Finish. 10	Total. 100
A. Not stirred ..	36.18	14.18	14.25	17.52	10	91.19
B. Stirred.....	36.34	14.27	14.39	17.81	10	92.81

or a difference in favor of the stirred curd, of 1.62.

The results of this work would indicate that even under our very best conditions the curd should be stirred sufficiently to allow for the escape of the free moisture before the curd is allowed to mat, though the amount of stirring will all depend on the condition of the curd at this particular stage, and is a place where the cheesemaker must use his best judgment. Moisture of curd and cheese in this experiment.

——	Curd.	Green Cheese.	Cured Cheese.
A	53.21	35.57	35.32
B	46.98	35.15	34.96
	6.23	.42	.36

The next series of experiments were a comparison of over-ripe with normal milk. The method of conducting the experiments was to make up the milk which was delivered in an over-ripe condition into cheese, and on the following day when the milk was in a normal condition make this also into cheese and compare results. There were twelve experiments made, seven of over-ripe, using 16,413 lbs. milk, testing 3.46 per cent. of fat and 2.36 casein; loss of fat in the whey, .26. There were five tests made with the normal milk, using in all 6,408 lbs. milk containing an average per cent. of fat of 3.38 and casein of 2.31; loss of fat in the whey, .23. The over-ripe milk remained in the whey an average of 51 minutes, the normal lots 2 hours and 39 minutes. The average yield of cheese was 88.96 per 1,000 lbs. milk for the over-ripe lots, and 91.44 lbs. from the normal. In the first case it took 11.17 lbs. of milk to make one pound of cheese, and in the other case 10.78. The quality of the cheese as indicated by the average score was:

	Flavor. 40	Closeness. 15	Color. 15	Texture. 20	Finish. 10	Total. 100
Normal.....	36.25	14.87	14.89	17.81	.....	93.84
Over-ripe.....	35.83	14.2	14.29	17.63	.....	91.73
	.42	.69	.62	.17	.....	1.91

The normal milk made 2.48 lbs. cheese per 1,000 lbs. milk more than did the over-ripe milk, though the over-ripe milk tested slightly higher in both fat and casein. Roughly speaking, there is a loss of 2½ lbs. cheese for every 1,000 lbs. milk delivered to the factories in this condition. Surely this is strong enough argument to induce the producers of milk to make some special effort to take proper care of the milk during the warm weather.

The next experiment I wish to draw your attention to very briefly, is a comparison of the yield and quality of cheese produced from milk containing different percentages of fat and casein. This work was commenced in May and continued until the end of October, one experiment being made each week during that time. The method followed in making these tests was to select the milk high in fat and casein and put it into one vat, and that low in fat and casein and put it into another. Both vats were treated as nearly alike as possible. There were eighteen tests made in all, using 20,692 lbs. of milk. The average fat and casein were for the A or high testing vat, fat 3.86 and casein 2.65; and for the B or low testing, fat 3.52 and casein 2.44, a difference of .3 of one per cent. in fat and .2 in casein.

The A, or high testing lot produced 97.34 lbs. of cheese for every 1,000 lbs. of milk used. The B, or low testing produced 92.70 lbs. of cheese for every 1,000 lbs. milk used, or a difference in favor of the higher testing milk of 4.64 lbs. of cheese for every 1,000 lbs. of milk used; or expressed in another way, the A, or higher testing milk took 10.27 lbs. of milk to make one pound of cheese, while the milk low in fat and casein took 10.78 lbs. of milk to make one pound of cheese, or a difference of .51 or ½ lb. of milk to every lb. of cheese produced. The quality of the cheese was slightly in favor of the milk testing lower in fat and casein, though this may be due to the condition in which the milk was received, as the sanitary condition of the milk has more to do with the quality of the cheese than has either the fat or casein content. This is particularly true in regard to flavor. The results of these and other experiments should be an inducement to patrons of cheese factories to adopt some better means of distributing the proceeds than the pooling system affords, although you often hear doubts expressed as to the accuracy of sampling milk at the weigh cans as commonly practised at the factories.

In order to get some information on this question we conducted some experiments which may be of interest to those who hold this opinion. The method followed was to take a sample from the top and bottom of the weigh can as soon as the milk was poured into it, continuing this at intervals of two minutes for fifteen minutes. We found as a result of this work that the tests were practically the same for a period of ten minutes, so that under ordinary conditions the samples as taken at the weigh can may be considered correct.

Mr. Barr: I would like to ask Mr. McKay if in handling over-ripe and normal milk in Mr. Harcourt's experiment, did he make any difference in cutting them.

Mr. McKay: No, we treated them exactly alike in all respects. We used a quarter knife in all our work. In the other experiment with over-ripe milk we took the night's milk that was over-ripe and followed it up with the next day's milk.

Q.—Don't you think the usual method of handling over-ripe milk in the factory would indicate more loss than you found?

A.—Yes, you must always consider that in handling small quantities of milk, you can do it much better than when handling large quantities.

Q.—A cheese factory would have more loss than your experiment shows?

A.—They certainly would, and it would make a greater loss in the cheese when you come to score them.

Prof. Harcourt: That point is made clear in the two figures .86 and .25.

Mr. Bell: Do I understand that the moisture content in the cheese was greater from the curd that was not stirred.

A.—Yes. The moisture content was slightly greater in the cheese. That may need a little explanation. When you are handling these small curds you can leave a considerable amount of moisture, and it does not appear to affect them to the same extent that it does when you have a large quantity. The flavor of the one not stirred was 35.35, the flavor of the one stirred was 36.01, and where we used the large vat the flavor of the not stirred curd was 36.18 and the flavor of the stirred curd was 36.34.

Mr. Barr: I think we had better keep stirring them pretty well

Mr. McKay: I think so.

Mr. Bell: The extra weight would not balance the quality?

Mr. McKay: No; I m in favor of stirring curds.

AUCTION SALE OF CHEESE.

Mr. J. A. Ruddick, Dominion Dairy Commissioner, attended the sale of the Dairy Exhibits, and before the proceedings were opened he made the following proposition:—It so happens that I want about one hundred or so of fine looking cheese for exhibition purposes at London, England, at the Festival of the Empire, which is to be the greatest exhibition Canada has ever taken part in. I got a requisition for these cheese only a short time ago, and I was not able to get them from the factories in the ordinary way, and I thought we could make a selection from these cheese that will suit the purpose very well. It would be a nice thing for this Association, and for the exhibitors at our exhibition here, to send their cheese to England from this exhibition, and I propose to offer you twelve cents for these cheese and take my chance of disposing of the ones we do not want ourselves.

I have spoken to the buyers, and the only point they raise is that they want me to make it clear that this is more than the present market value of cheese. I think, however, it is a perfectly fair price, because there is not any cheese here but have had extra work put on them. They are nice, stylish looking cheese, and I am quite willing that the makers should receive something for that, as an encouragement for that sort of work, and it suits us very well to get the cheese in this way.

There is only one condition that I would like to make if this offer is accepted, and that is that you will not bore them any more, because you will spoil them for exhibition purposes, and I know you will all respect that wish.

I do not want to make this deal if there is any objection; if you think they will bring more at auction, let them go, that way. If there is any objection now is the time to speak.

I think it would be a good thing for the district and for the Association to have the cheese taken in this way for this important exhibition. The cheese will be exhibited in a refrigerator, and will make a very fine appearance.

THE AUCTIONEER: Now, gentlemen, if there are any persons who have any objection to this proposition I would like to hear from them now, or let them forever hold their peace.

There were cries of, "Sold," "Sold," and the cheese were awarded to Mr. Ruddick on the conditions offered by him.

CREAMERY REPORT, 1910.

FRANK HERNS, CHIEF DAIRY INSTRUCTOR AND SANITARY INSPECTOR FOR WESTERN ONTARIO.

The Instructors visited 92 creameries. This is 19 more than last year, and is accounted for by taking over five in the north, formerly visited by the Eastern Ontario Instructor. Several plants in Toronto now make butter, and a couple of cheese factories turned over to butter making make up the balance.

The quality of Western Ontario butter showed improvement last year. When we consider that practically all of this butter is made from collected cream, in many cases collected two or three times a week, and hauled long distances, we believe that progress is being made. The print trade has increased, while the home consumption in Canada is growing every year. Very little complaint was heard of mould and mottles.

17,971 patrons sent milk and cream to the creameries, this is 2,664 more than last year. A great improvement in the quality of the cream, and consequently the quality of the butter, can be brought about if the patrons, many of whom up to the present time have not taken proper care of the separators or the cream, can be induced to take more interest in this matter. The Instructors were able to visit the farms of 323 patrons, going out on the cream routes with the haulers and using what little time they had to instruct the patrons in the care and handling of separators and the cooling and care of the cream. This is good work and in all cases brings results, but with the large number of creameries and the large territory which the two creamery instructors have to cover, it is difficult for them to accomplish all that could be desired among the patrons. We believe there is room for one more creamery instructor who should devote all his time to the farm side of the work, and we think that could arrangements be made whereby such a man might be engaged the result in the improvement of the cream would many times repay the cost.

We made during the past season 9,552,000 lbs. of butter. This is an increase over 1909, of 1,602,000 lbs. This does not include the butter made at the extra creameries which were added to our list this year, the cream shipped or the dairy butter made.

The average per cent. of fat in the cream was 25.8 per cent., an increase of 5.9 per cent. over 1907, showing that our agitation for a richer cream is bringing results. The patrons are beginning to realize the advantage both to themselves and the creameries of skimming a cream containing not less than 30 per cent. of fat.

	Northern.	Southern.	Total.
	M. Robertson, Instructor.	Fred Dean, Instructor.	
Creameries	41	51	92
No. of Patrons sending cream	9,992	8,051	18,043
Tons of Butter made 1909 (6,560,000 lbs.)	1,545	1,735	3,280
Tons of Butter made 1910 (9,552,000 lbs.)	2,134	2,642	4,776
*Gain in tons, 1910 (2,992,000 — 1,390,000=1,602,000 lbs.)	589	907	1,496
Full day visits	81	134	215
Call visits	54	36	90
Patrons visited	162	161	323
Average % fat in cream	24.9	27	25.9
No. of tests made for moisture	180	272	452
Average % moisture	14.68	15.75	14.71
Samples showing over 16% moisture	16	33	49
No. Creameries samples taken from	8	20	28
" " cream collecting	43	40	83
" " both C.G. & S.	2	8	10
" " Separator	1	2	3
" " using Babcock Test	37	49	86
" " " Oil Test	5	1	6
" " " Box Churn	2	1	3
" " " Combined Churn	40	49	89
" " " scale for sample	17	6	23
" " " large cans, C.C.	28	2	30
" " " jacketed cans, C.C.	0	8	8
" " " individual cans, C.C.	3	20	23
" " " cream tanks, C.C.	13	0	13
" " " small cans, C.C.	0	11	11
" " first class storage	21	23	44
" " fair storage	8	18	26
" " poor storage	7	7	14
" " no storage	6	2	8
Average temperature of storage	47.2	48	47.6
No. Creameries good water supply	40	36	76
" " fair water supply	2	11	13
" " poor water supply	0	3	3
" " good drainage	26	38	64
" " fair drainage	10	9	19
" " poor drainage	7	1	8
" " using culture	4	11	15
" " " coolers	12	18	30
" " " pasteurizers	5	8	13
Expenditure	$3,054	$9,275	$12,329

*Gain in tons. 695 tons was subtracted from the total gain as representing the amount of butter made by the extra creameries taken over by the Western Ontario Creamery Instructors in 1910. 810 tons, or 1,602,000 lbs., is the actual gain by the creameries visited last year.

Six creameries only now use the oil test, 4 less than last year. We trust the time is not far distant when the out of date oil test will be known only in memory.

Sixty-nine creameries use the pipette in testing cream. Twenty-three creameries use the scales, 9 more than last year. Several of these creameries use the scales only when selling cream. Why? We are assured that there is now placed on the market a twelve bottle cream scale which is free from the objections raised with respect to balancing of some of the scales formerly sold for weighing cream samples; therefore, any arguments against the use of scales cannot now be considered of as much importance as formerly, at least from the standpoint of scale accuracy.

Thirteen creameries pasteurized the cream, one more than last year. This is not gaining ground very rapidly, yet it is believed to be one of the ways in which the keeping quality of our butter may be improved. Richer cream is required at many of our creameries when they will no doubt be in a better position to adopt pasteurization.

Four hundred and fifty-two tests were made for moisture, the average moisture was 14.71 per cent., or .05 per cent. more than last year. Forty-nine samples containing over 16 per cent. moisture were taken from 28 creameries, 8 in the Northern Group, and 20 in the Southern. This is a very good showing considering the amount of butter made. Care should, however, be taken not to work too close to the moisture limit.

One of the defects mentioned of our butter is uneven salting. It appears somewhat difficult to have different days' make (although the same per cent. of salt is used), retain to the taste about the same amount of salt in the finished butter, having a uniform loss in the working. Silver Nitrate salt tests with potassium bicromate indicator were supplied to the instructors for use the past year, and a large number of tests for salt were made. Five per cent. was the average salt used, and 3.5 per cent. the average salt left in the butter. Variations as shown by the salt test were numerous and we are not yet certain from the work done that this test is entirely reliable as it is difficult to get the salt from the butter properly dissolved and incorporated in the water from which the sample for the test is taken. We expect to use this test again next year and endeavor to have it checked up by other analysis so that we hope to know more about its accuracy and usefulness. We would also like to determine what condition of the butter such as, temperature, moisture, etc., conduces to a more uniform percentage of salt being left in the butter. The question is important, and no doubt deserves more attention than has been given it in the past.

Twenty-two creameries still measure the cream at the farm allowing, we presume, 4.1 lbs. of cream to the inch. As the weight of a given volume of cream varies somewhat in proportion to the acidity and percentage of fat, we would think it more accurate to weigh the cream. Beam scales are procurable which give good results.

Some of the storages go too high in temperature during the warm months. The average temperature during the past season was 47.6 degrees. We trust an early improvement will be made in some of our creamery cold storages.

The majority of our creameries are now kept clean and tidy. Some, however, are reported in only fair condition, while a few could be decidedly improved in this respect. We hope that it will only be a short time before we can point to all our creameries as models of cleanliness and order.

Sixty-five creameries have good drainage, 21 only fair, and 6 poor. The drainage problem should be looked into by those creameries which have not yet put their drainage in good condition, as this is a very important factor in the sanitary condition of the creamery and in the manufacture of first-class butter as well.

$12,329 was spent in improvements last year, including some outlay with respect to water supply, drainage, and sanitary conditions which were badly needed at some of the creameries.

Creamery District Meeting at Guelph.

This meeting was again held at the Dairy School during the time of the Winter Fair. It was exceptionally well attended, and many subjects of particular interest to the creamery men were discussed. A full report of this meeting will no doubt be published.

I wish to thank the creamery men for their hearty co-operation, and the instructors for their kindness to me. The instructors have done everything in their power to improve the quality of the butter, the quality of the cream, the condition of the creameries, to get more uniform systems of payment and manufacture adopted, and have worked hard to make the season a success.

THE OUTLOOK FOR DAIRYING IN CANADA.

J. A. Ruddick, Dominion Dairy and Cold Storage Commissioner, Ottawa.

I have been attending the Annual Conventions of this Association regularly for over twenty-five years, and I have observed, as no doubt others have done, that practical subjects such as discussions on cheesemaking or buttermaking, have always been the most popular ones. That is quite natural in a meeting composed almost entirely of practical men, and it is that desire to know which has made the Canadian cheesemakers and buttermakers better informed on the principles underlying their arts than any others in the world.

Conditions have changed, however, since the early days of the Association, when this annual meeting was practically the only source from which the cheesemakers and milk producers could obtain light on the problems which confronted them in their daily work. We now have the dairy schools, the travelling instructors visiting all factories, the district meetings, the farmers' institutes and clubs and much more abundant dairy literature, and it would appear that more attention may properly be given to the commercial side of the industry, and those broader questions which bear on its future as well as on its present state.

I hope, therefore, that I may be able to present some views of the outlook for Canadian dairying that will be of sufficient interest to command your attention for a few moments.

I propose to present this subject for your consideration under two heads: (1), the possibilities and probabilities of an increased milk production, and (2) the chance for marketing an increased output at paying prices.

In taking up the first question, it may help us to arrive at a conclusion if we review the situation during the last few years and thus find a basis of calculation for the future.

I need hardly go over the familiar story of the decrease in our exports of butter and cheese from 1904 down to 1908. Great emphasis has been laid on this. I have no doubt you are aware also that this decrease has been accepted by some as an evidence of decline in the dairy industry; an assumption which is entirely unwarranted, as I hope to prove to you before I finish.

As the shipment of cream to the United States has grown to large proportions, and must be reckoned in our export trade, it may be as well to consider this item first. The genesis of this market for a part of our dairy production is well known to most Canadian dairymen, but it may not be out of place to restate it briefly.

Previously to August 5th, 1909, the duty on cream entering the United States was 2 cents a pound. In the Payne-Aldrich tariff, which came into force on the date mentioned, the duty is reduced to 5 cents a gallon. As a gallon of rich cream will make over 4 pounds of butter and the duty on butter is 6 cents a pound, the inducement to Americans to import cream is easily understood. Creameries have been erected at many points along the border and large quantities are shipped to the New England cities of Boston, Worcester and other points.

I may say in passing that there has lately been developed in connection with this trade a demand for wet casein, or skim-milk curd, and it would appear that this method of disposing of the skim-milk where cream is shipped may be an additional source of revenue. This applies particularly to cheese factories engaged in the cream trade. The ordinary cheesemaking apparatus can be used for making wet casein, and the whey which is left is practically the same as that from cheese manufacture. The manufacture of casein has the additional advantage of keeping the cheese factory establishment in working order.

The first shipments of cream were made in August, 1909, and the record month by month since that date is as follows:—

Month.	1909–10.		1910-11.	
	Gallons.	Value.	Gallons.	Value.
		$		$
April	.....	.....	16,263	18,488
May	.....	.....	52,430	55,150
June	.....	.....	152,070	145, 18
July	.....	.....	238,805	221,559
August	1,650	1,640	266,967	265,238
September	12,160	12,050	271,463	262,393
October	39,099	40,109	327,064	309,919
November	70,059	71,020	.....	.....
December	31,807	37,483	.....	.....
January, February, March	81,447	82,140	.....	.....
Totals	236,222	244,442	1,325,062	1,278,565

If the shipments are continued for the remaining month of the fiscal year at the same ratio of increase over last year as there was in October, the total export for the twelve months will be 2,811,566 gallons, or the equivalent of 13,000,000 pounds of butter, or 28,115,000 pounds of cheese. Expressed in terms in more common use that quantity of cream represents 374,875 boxes of cheese at 75 lbs. each, and the value will be nearly $3,000,000. The increase in the cream shipments in 1910-11 over the previous year will be equal to 340,000 boxes, or 25,000,000 pounds of cheese. If this quantity had been added to our cheese or butter exports for the present year, as it would have been without the cream trade, the increased exports in these two articles would have been that much larger.

Having these figures before us, we are now able to estimate with fair accuracy as to the exports for the fiscal year which will end on the 31st of March next, and a comparison with previous years will be interesting at this point.

Comparative values of exports for years ending March 31st, 1909, 1910, and 1911:

——	1909	1910	1911
			(Estimated.)
Cheese	$20,384,666	$21,607,692	$21,000,000
Butter	1,521,436	1,010,272	800,000
Condensed Milk			400,000
Cream	90,520	541,372	3,000,000
Case in			40,000
Totals	21,996,622	23,159,336	25,240,000

Now, I wish you to note that the total value of the exports for the current year, in spite of the lower prices for cheese, will show a substantial gain over the two previous years, so that since 1908 our surplus for export has been increasing, not decreasing, as is frequently stated. In considering this matter we must always include all products to make fair comparisons.

If we compare the present year with the year ending June 30th, 1903, in which year the exports reached the record value of $31,667,561, we find the shrinkage is only about $6,500,000. But this is not the whole story by any means, for we must take into account the enormously increased home consumption in the meantime. Few people seem to realize what a great difference an increase of, say, 2,000,000 people has made in this respect. I have endeavored to estimate the average per capita consumption of milk, cream, butter and cheese in Canada, by approaching the question from many different points of view, and I am convinced that it amounts to not less than $10 per head on the average, at the present level of wholesale prices. With our present growth in population, that means an increase of over $2,000,000 a year in home consumption. The general prosperity of the people has resulted in a steady increase in the consumption of milk, cream, butter and ice cream of late years, and I feel that it is safe to say that the home consumption of these products this year is $25,000,000 greater than it was in 1903.

Now let us see where we stand, compared with 1903, if we take into account the increased home consumption:

Total exports, 1910-11 (estimated)	$25,250,000
Add increased consumption as compared with 1902-3	25,000,000
	$50,250,000
Exports in 1902-3	31,667,561
Increase in production in 1910-11 as compared with 1902-3	$18,582,439

It must be apparent to anyone that, in order to determine the value of our export dairy trade as at present constituted, we must now consider several products in addition to butter and cheese, and that the trade with the United States is constantly growing in importance, as the following table will show:

The values of dairy products shipped to the United States during the years ending March 31st, 1908, 1909, and 1910:

	1908	1909	7 months ending October, 1910.
	$	$	$
Cheese	17,732	19,428	24,459
Butter	38,899	18,246	79,561
Cream	2,737	8,256	1,278,865
Condensed milk			10,538
Casein			20,731
Sweet milk	.....	.....	3,257
Totals	59,368	45,930	1,417,411

Down to the beginning of the present fiscal year the exports of sweet milk, cream and condensed milk were included under one head in the Trade and Navigation returns. You will observe that the figures given for the present year are

for seven months only. In all probability the total exports to the United States for the fiscal year which ends March 31st will amount to not less than $3,000,000.

I have dealt at some length with these points, because I look upon it as most important that any misconception as to a decline in the dairy industry of Canada should be effectually removed. To have such statements constantly repeated would be one of the surest ways of bringing about such a result. There are a great many people who reach their conclusion in such matters from what others say rather than from their own reasoning. There are many people who would be inclined to give up dairying if they heard that others were doing so. All this goes to show the advisability of getting away from our old habit of judging the progress and the extent of the dairy industry by the surplus of butter or cheese which there may be for export. That method served well enough to show the annual growth of the industry when the annual increase in population was very small, but with the rapid increase of late years, and the consequent enormous growth in the home consumption of milk, butter and cheese, it has proved to be entirely misleading. When we consider that the total production of milk in this country reaches the enormous value of about $100,000,000 a year, it becomes apparent at once that the small part of that which is exported does not, and never did, for that matter, adequately represent the volume and magnitude of the industry. But I shall not dwell longer on this point, because I believe it is relatively unimportant. There is a sort of fascination about big figures, which induces many of us to get up and rattle them off in a spirit of boastfulness which may cause the important things to be overlooked. Attention should be focussed on individual achievement rather than on aggregate results. If we are to believe statements made in this connection, a very large proportion of the milk is produced without profit. If that is so, the big total means very little. Let us look carefully after the items, and the totals will care for themselves.

To take another view of the present situation and the inferences that may be drawn from it for the future, I would ask you to consider for a moment some of the conditions which prevail in other provinces.

I am aware that this convention represents the dairy industry of Western Ontario, but it would be a very much mistaken policy for the dairymen of one of the largest cheese-producing districts in Canada, and in some respects the most important, to exclude from their deliberations any reference to what is being done in other parts of the country. The tendencies of the industry, the probabilities of increased production, etc., in other sections, are matters that are second only in importance to those of purely local aspect.

In the Maritime Provinces the dairy industry is making some progress, especially in Prince Edward Island. The output of cheese in that province made a gain of over 30 per cent. in 1909 and shows a still further, though smaller, increase in 1910. Very unfavorable weather during the latter part of the season curtailed the supply of milk.

The output of butter grows larger every year in the prairie provinces and also in British Columbia, though the quantity produced at present is far short of the needs of those growing communities. Although there are a number of cheese factories in Manitoba, and ten or twelve smaller ones farther west, in Alberta, this branch of the industry makes very little headway, and it should not be encouraged until conditions are more favorable to it.

In Quebec conditions governing production remain very much as they have been for some years, but there is a growing tendency towards the consolidation of small factories, which will make for improvement, and there is likely to be a change

in the working of the system of instruction by bringing the instructors directly under Government control and independent of the factories. We may look for good results to follow in more than one direction.

While there are individuals here and there who, for one reason or another, have given up dairying, and even small districts where the production of milk shows a decrease, there is, on the whole, throughout the Dominion a good healthy tone to the industry. The high price of cows is a good indication of the present attitude of farmers towards it, and it is gratifying to note that buyers are now showing more discrimination in favor of good milking strains.

Those of us who have been in close touch with the cow testing movement since it was started are able to see a very decided, if somewhat tardy, awakening of interest in that work. The question of herd improvement, in my judgment, is the most important one which may engage the attention of milk producers or factory owners. That is why the Dairying Service at Ottawa is giving so much attention to it, and why the Minister of Agriculture authorized me to invite Mr. Hull here to address you, along with others, on the subject. We are prepared to extend this work as fast as the farmers are ready to take it up, and to lend encouragement in every reasonable manner. I am pleased to announce that the Minister has approved of a plan for the further promotion of this work, whereby we shall have men in charge of small districts covered by four or five cheese factories, so that they will be able to get into touch with every one of the patrons and get the average milk records of all the herds, even when the owner will not undertake to keep individual records. The information obtained in this way will be accurate and instructive, and the constant presence of an enthusiastic advocate amongst the farmers is bound to have a stimulating effect.

The cow testing movement has not spread as rapidly as might have been expected, considering the important relation which it bears to profitable dairy farming, but we are making progress in the work, and the number of cows recorded has increased largely every year. I believe the common sense of the majority of Canadian milk producers will eventually lead them to adopt a plan which offers so much in return for comparatively little labor and outlay.

Already we have records from many herds showing increases of 20, 25 and even 30 per cent. in the average yield, as the result of an intelligent application of the knowledge gained through the systematic study of the performance of individual cows. If the average yield per cow could be increased by only 500 pounds of milk a year, it would mean an additional production of over $10,000,000. It would be one of the simplest and easiest things to do, if all farmers could only be made to realize to the point of action the possibilities which lie before them in this direction. I predict that a large proportion of the two million odd cows in Canada will in a few years yield fully 50 per cent. more than they do at present. Indeed, there is good reason to believe that much of the increase in production which I have outlined may be traced to this source, as the number of cows does not appear to have increased in proportion to the increased output.

Turning now to the market end of this discussion, I would say at the outset that there is nothing in sight which need offer the slightest discouragement to a largely increased production. The home market, which as I have already shown, absorbs something like $80,000,000 worth a year of milk and its products, is expanding rapidly, and at the present rate of increase would wipe out our surplus for export in less than ten years if production remained stationary. As a matter of fact, it would have been wiped out already had there not been a large increase

in production since 1903. But I do not think there is any immediate danger of losing our export trade either for lack of a market or for lack of something to supply it with.

The maw of Great Britain is never satisfied, and we always have that market open to us on even terms at any rate.

Trade with the West Indies continues to grow steadily. Canadian butter and cheese have become well established in that part of the world.

In the United States, although that country is the largest producer of dairy products in the world, the supply has for several years fallen short of the demand, and they imported butter and cheese to the value of $6,694,540 during the calendar year 1909. Canada is a natural source of supply for the United States, and our trade is likely to grow in that direction.

The situation in the markets of Great Britain in regard to Canadian cheese has changed somewhat since the New Zealand imports have become a factor in the trade. The shipments of New Zealand cheese have increased from 9,000,000 pounds for the year ending June 30th, 1904, to 50,000,000 pounds for the same period ending in 1910. It will depend very largely on the relative price of butter and cheese whether the increase will be continued or not. Private advices from New Zealand intimate that the present season began very badly with cold weather and much lack of rain in some districts, and that the cheese shipments for the season just beginning are much smaller than they were last year.

The arrival of 50,000,000 pounds of New Zealand cheese on the market during our winter months has lessened the speculative demand for Canadian cheese to supply the winter trade, but we gain from the fact that a larger proportion of our summer cheese is now wanted for immediate consumption, and a higher level of prices is maintained during the period of greatest production. Formerly the demand fell off at that season, as a result of over-supply, and much of the cheese found a sale only when the price went low enough to encourage buying on a speculative basis.

It is rather remarkable that the increase in New Zealand receipts for the year ending June 30th, 1910, as compared with 1904, should tally so closely with the decrease from Canada for the same period. The difference between the increase on the one hand and the decrease on the other was only 538,200 pounds, the decrease from Canada being that much less than the increase from New Zealand.

There is another feature of the market situation which is worth noting. If we take the average imports of cheese into Great Britain from all countries for the years ending June 30th, 1900 and 1901, and compare them with the average for 1909 and 1910, we find that the quantity has fallen off to the extent of over 44,000,000 pounds. This is taken by some to represent a decline in the consumption of cheese in Great Britain. The shortage is probably partly met by an increased home supply. It is claimed that there has been a large increase in the output of Cheshire cheese of late years. The home production of cheese in Great Britain is something like the home consumption in Canada, the figures of which do not appear in any annual statistical accounts, but it is well to bear in mind that Great Britain, next to the United States, is the largest cheese-producing country in the world, and much larger than Canada.

If the decline in the imports of cheese into Great Britain really does mark a smaller consumption—and I think there is some truth in that claim—it becomes a matter of no little importance and is well worth inquiring into.

Personally, I believe that the immature condition in which much of our cheese has been put on the market has had a great deal to do with it, and with

the lower price which prevailed in England for Canadian cheese during the past summer. There have been very serious complaints on this score, especially since the cheese has been going more directly into consumption. With strange perverseness, we have shipped our cheese greener at the very time when they should have been more fully ripened. I have spoken rather plainly on this subject on other occasions, and I think the present is a good time to do so again, for I believe it has cost the cheese factory patrons of Canada nearly a million dollars in reduced prices in 1910, to say nothing of the injury to our reputation and the effect that it may have in the future. I know all the arguments that are used to excuse the practice, most of which are unsound, and although there may be some temporary advantage in getting rid of cheese when only a few days old, we will reap the consequences of our folly in the end.

It seems to me, Mr. President, that this is the sort of question which your Association should deal with, because it is your members who are most interested and who will suffer if mistakes of this kind are made.

Now, I do not want any one to imagine for a moment that Canada has lost, or is yet anywhere near losing, her premier position in the cheese markets of Great Britain. We still supply about 65 per cent. of the total imports, and 77 per cent. of the kind which we make, and, apart from the green condition, the quality of our cheese has improved of late years.

I do not wish either, in anything that I have said respecting the extent of our home trade or the trade with the United States, to minimize the importance of the export trade with Great Britain. As long as we have a surplus for export, the value of the whole production is determined very largely by the price which is obtained for that surplus. We should guard very carefully, therefore, our interests in this connection, and see to it that nothing is allowed to injure the high reputation which our cheese, especially, has attained on that market.

REPORT OF THE NOMINATING COMMITTEE.

The report of the Nominating Committee was then received and adopted. The list of officers appears on page 6.

DAIRY ADVANCE.

G. A. Putnam, Director of Dairy Instruction, Toronto.

It is always a pleasure for me to meet with the dairymen of Western Ontario, for when we meet with this enlightened and progressive Association we know we are meeting with an efficient and capable lot of cheese and butter makers who have for the most part made good in their factories or creameries. We also congratulate ourselves in the Department, not only that we have a lot of good makers in the Province, but that we have been very fortunate in being able to secure first-class men to represent us as Dairy Instructors, especially in the two Chief Instructors, Mr. Publow in the East and Mr. Herns in the West. We know that in them we have a strong team, and we feel that we are quite safe in having these men to take direct charge of the inspection and instruction part of the work.

It is gratifying to the Department to note the general advance that has been made in all lines of dairying. We have heard from Mr. Ruddick this afternoon that the dairy industry is likely to continue to form one of the chief, if not the chief, lines of agricultural industry in Ontario, and with the fast-growing remunerative market, more especially the consumption of milk and cream in our towns and cities, and the prospects of continued good markets in the Old Land, we can expect remunerative prices for all lines of dairying products in the years to come.

It is the exception to meet with Canadians who know the true food value of good cheese, and it is still more rare to find a family which consumes cheese in large quantities. There is no doubt that there is, dollar for dollar, a great deal more value derived by the consumer in purchasing cheese rather than meats, and while a few wholesalers and retailers seem to appreciate the opportunity for developing a trade in fancy cheese for Canadian consumers, this market has not been developed as it should be. A pound of cheese can be placed in the consumer's hands when it is well ripened, that is, a year or more old, at 15 cents or 16 cents a pound. A few consumers are now getting direct from the factory at the regular wholesale price at the present time, at a little over 11 cents a pound. It is time that the consumer as well as the producer considered the advantages in developing this feature of the Canadian cheese trade.

While the total expenditure in giving instruction in the factories and creameries, the running of our Dairy School, and the holding of factory meetings involves a net expenditure of $57,000 on the part of the Provincial Department of Agriculture, we are convinced that the money thus spent is a good investment, in so far as both the immediate and future prosperity of the business is concerned. It is a good business proposition to foster an industry which has been such a factor in the development of the agriculture of the Province, and makes for the prosperity of the people as a whole, and especially in the Eastern sections of the Province. While we have accomplished much by way of improving the factories, raising the standard of the cheese and butter, and establishing a uniformity in the goods, we must not forget that the greater our successes the greater the responsibility resting upon us. Accomplishment means added responsibility and increased watchfulness. Dairymen are not easily satisfied. Their watchward is "Advance." All this means greater effort on the part of all concerned—the producer, the factory men, and the maker.

The producer has accomplished much. The average production of the cow has been materially raised in the past few years. We are only now feeling our way, as it were, and the next few years will see great advances, as we have practical demonstrations on many hands as to what can be done by judicious selection and breeding. The producers are taking greater pains to raise crops best suited for their dairy cattle and so improve methods in feeding. Silos, soiling crops, and the production of alfalfa, all bespeak advance, and it is the man who is already producing six to eight thousand pounds per cow who is the most solicitous in getting information which will enable him to still further increase the output. While as much, or more, attention has been given to instruction in the methods of producing and handling milk on the farm, thousands of pamphlets being distributed each year, and the agricultural press giving due prominence to this feature of dairying, yet it is to be regretted that many producers do not yet appreciate the importance of the strictest care in handling and cooling milk. Sanitary milk production is the foundation of successful dairying, whether the object be to supply the milk and cream trade, manufacture butter, cheese, or condensed milk;

but we cannot hope to make much further advance in Ontario until a uniformity of method is followed in this respect. We therefore appeal to the makers, the proprietors of factories, and the officers of joint stock companies to co-operate in this important work. It is the intention of the Department to try to still further emphasize the care of milk. We have, especially in Western Ontario, a capable, well qualified lot of makers, but they are seriously handicapped when they cannot always depend upon a uniform supply of good milk. The producers do not appreciate the additional gain, not only in quality but in quantity, when milk is delivered to the factory in a sweet, clean, cool condition.

I have had instructions from the Minister to call together representatives of the two Associations and the two Chief Instructors to give the matter of the care of milk full consideration, and we are going to endeavor to formulate some plan which will result in a more gratifying, effective work along this line. We have distributed annually during the past four seasons 60,000 leaflets on care of milk and cream, and we are glad to know that this has had some effect. But it is discouraging to find that in nearly every factory you find careless men. We have also appealed to another class who have more influence in bettering the quality of dairy products, that is, the women upon the farms. We have sent special bulletins to the members of the Women's Institute, and we have had special articles prepared for their annual report, and we are appealing to them to assist us in seeing to it that a better milk supply is furnished. They have done much, and you can depend upon it that as the organization grows, and it is growing fast, the women are getting past that stage when they devote their whole time to exchanging recipes and talking food topics. They are reaching out and taking an interest in the financial side of the farm, and when we impress the ladies with the fact that by a little extra care on the part of those who look after the milk upon the farm the returns will be materially increased, I think we will appeal to them successfully. The producers do not appear to appreciate the additional gains, not only in quality but in quantity, when milk is delivered to the factory in a clean condition.

A young man in a young country such as this, and where the opportunities are so attractive, cannot afford to become identified with an industry which does not hold out bright prospects for the future, and assure him a comfortable living. Cheese-making is an industry which calls for special ability and training on the part of the maker, and it requires a man of more than average ability to make a success of the business. He must not only be strong physically and do his share of the manual labor, but in addition he must give close attention to the method of manufacturing and business management. The bricklayer who works according to instructions furnished him, and whose duties are mechanical, commands a higher salary than the cheese-maker, and so with the moulder and the mechanic. There must be something wrong with an industry which involves such a large investment of capital and the employment of so much labor, when the men who are directly responsible for the quality of the goods are not better protected and better paid. It is quite true that many cheese-makers have done well and are making good money. There is abundance of wealth and prosperity in the well-dressed men with the fur coats that are here to-day; but the fact remains, as I have stated, that many cheese-makers are not making as much money as they should.

In providing for the granting of certificates to makers, the object is to equip the factories throughout the whole Province with capable men, and an indirect result must be that the position of the qualified men will be protected.

While the basis upon which the certificates are arranged is at the very start liberal, the proper regulation of the issuing of the same from year to year will gradually improve the standing of makers, and the small factory which at the present time does not handle sufficient goods to enable them to pay the price to induce a first-class man to take charge, will find it necessary to amalgamate with adjoining factories or make a greater effort to get the farmers in the locality to keep a larger number of cows.

We are issuing permanent certificates, signed by the Minister of Agriculture and myself, to all those who are looked upon by the Advisory Board as capable men. There are a few who have shown a little carelessness and have not done their best, and some who probably have done their best but have not had the necessary practical experience, who will get certificates good for only one year, printed across the top in red letters, "Given for one year only." The Chief Instructors, Mr. Herns in the West and Mr. Publow in the East, will make it their business to give instruction to and, as far as possible, call upon these individuals and watch them closely throughout the coming season, to give them what assistance they possibly can. Then if these men work honestly and do their best, they may rest assured that in the near future they will get their permanent certificates.

Some assistants who have applied for certificates will not be granted them at this time. While we are lenient in this matter and are not drawing the lines very tight, there are some who have applied who should take a Dairy School course this winter or have another year's experience before they will be given a permit to make cheese for the year as cheese-makers; and if they make good at the end of the year they stand a good chance of getting a permanent certificate.

It is better for us to consider the merits of the work carefully, and do the work right, rather than hustle it through and have to undo some of the things we have done. The makers should have some aim before them, and they should try to work towards a permanent business and make it so attractive that the young men will be induced to enter this business, or we might call it a profession, because a man who is a successful maker requires to be well qualified, not only along practical lines, but he must know more or less of the scientific. We want to see an attractive, comfortable, and well furnished factory. We have many of these in Western Ontario that are a credit to the industry, and we in the Department are very proud to get photographs of some of these excellent establishments. I see no reason why a factory should not become a sort of social centre for the community. Many of our factories are places that are run in the very cheapest way and are not kept tidy. They are merely places for making money. Of course, we all know that the cheese business is a business for making money; but why not make the establishment in which you work as attractive as possible? I appeal to you to set out a few trees and fix up the fences. Only the other day I got a photograph of a factory in Eastern Ontario, which while built of brick and excellently arranged inside, was most unattractive from the outside, with most dilapidated-looking fences about it, and we could not use the photograph because it would be a disgrace to the industry. I should judge that two hours' work would have made that place quite tidy.

We trust that the makers will do what they can to increase the tendency of the farmers of the community to take personal interest in the factory. I appeal to you as makers to do what you can to get the farmers in your locality to form some sort of local club where they can come together to discuss topics of interest to them as farmers, and particularly as producers of milk for cheese factories or creameries.

We have a good many of these clubs throughout the country. Form any sort of a local association, whether grange or club, or form one without any name. I appeal to the farmers to make a closer study of their own business. Take more of the agricultural papers and study literature sent out by the Department, and rest assured that when the Department is convinced that you are taking an intelligent interest in your own business they will be ready to help those who help themselves.

Mr. Ruddick: There is a matter which I think should be laid before this Convention, because I think you are all directly or indirectly interested in it. Representations have been made for some time to the Department of Agriculture at Ottawa that the Inspection and Sale Act should be amended in one or two particulars. That is to say, the Act in the Revised Statutes of 1906 covers the sale of butter and cheese, and the branding of butter and cheese, and the delivery of milk to factories. I will not undertake to go over the details of the Act, but it has been represented that in addition to the present definition for creamery butter, whey butter should be defined, and that there should be a grade called milled butter, that is, butter that consists of two or three or more kinds of dairy butter and creamery butter mixed together.

I am sorry to say that there is a practice of mixing dairy butter with creamery butter, and selling it without being branded. I had a prosecution out West against a man who was selling dairy butter and creamery butter, and branding it creamery. He stopped branding it and went on selling it in the same way, and we cannot do anything with him. A strong resolution was passed at the Convention of the Eastern Association, asking for this legislation with respect to whey butter, and I take it that it is desirable that it should be clearly recognized and sold on its merits. There are several other arrangements that are desired to be made.

Mr. Parsons: I am very pleased that this matter has been brought up, because it is of much importance.

Mr. Hern: As Secretary of this Association, I might say that the points which Mr. Ruddick has brought forward have at some time or other been discussed at the Directors' meetings. I do not think there is a single point in the suggestions which we are not justified in asking to be put upon the Statute books, and without taking up too much time in discussion.

Moved by Mr. Parsons, seconded by Mr. Herns, that this meeting endorse the bill which Mr. Ruddick has presented. The motion carried unanimously.

Mr. Parsons: I would like to ask Mr. Putnam whether anything has been done by the Association or the Department toward enlightening the public as to the value of cheese as an article of food at certain stages of its ripeness. I was approached two years ago by one of the newspapers of the city of Toronto, and asked to write an article as to the value of cheese as an article of food, but I hesitated to do so, not because I did not believe in it. It has been my experience for a number of years to have cheese kept until it reaches the age of two years that has been manufactured in our own factories. It is taken care of in an ordinary cold storage and kept from fifteen months to two years, and sometimes as long as twenty-seven months. It has been said, by those who have eaten it, to be cheese of the most excellent quality, and some of it was sold as high as 50 cents a pound. The party who paid that price for it lived in the State of Georgia and others in Alabama, and if we had one hundred boxes of it they would have bought it.

A gentleman who handled a considerable amount of these cheese sold it to people travelling up and down the country, and they stopped at his place and

offered him all kinds of money for it; but he had bought it for his own table use and would not sell. I think something should be done in the way of advertising the cheese of this country when it gets to a certain stage of ripeness. It is a better article of food than at any other time.

PROF. HARCOURT: I took up that question of the food value of cheese two or three years ago when I spoke of milk and its products, comparing it with other lines of food. In the first place, I think there is absolutely no doubt of the fact that milk stands as the very cheapest of animal products to-day. We can buy it cheaper at ten cents a quart than any meat at the ordinary price. We can stand a great advance in the price and will get it cheaper than anything else. I find that nearly everyone says that cheese is indigestible. I think it is largely due to the fact that most of the cheese that is on the market in the ordinary way in our grocery stores is comparatively new cheese, and, I am afraid, too often culls that are not allowed to go in the ordinary trade. The public, as a rule, do not get anything like the best quality of cheese, and more than that they get greeen cheese, which is perhaps indigestible to a certain extent. I frequently tell them it is not cheese but rubber that they are trying to eat, and that it should not have the name of cheese at all. I have no doubt that if we could get on the market cheese that is well ripened and of good flavor, a great advance in its use would be made in this country. If you will allow the cheese to ripen, I do not think you will be bothered with indigestion.

CARING FOR CREAM AT THE FARMS.

By G. H. BARR, Ottawa.

I want in the first place to congratulate our President on the position he occupies to-day. I can remember nearly the beginning of his career as a creamery man. I remember one Saturday night down in the Culloden factory, the first night we started to make butter, that our President (who was then not quite so big as he is now, but a good sized boy), was attending to the separator. He wanted to keep everything nice and clean and tidy, but he let the wiping cloth slip on the spindle of the separator, and I have never seen him look so white before or since. He worked for me for two years, and I found that he could set vats so they would dip within a minute or two of the same time each day. I find there are few men in this country able to do that, but it is just some of these characteristics in a man that bring him to the front. Many a day we went out into the woods to cut wood at 50 cents a cord when we were making cheese in the summer time and trying to eke out an existence in the winter; and then we used to attend a dance or two, and I played the fiddle and he did the dancing and calling off. (Laughter.)

You all know about the Act in connection with testing glassware. We have been getting a lot of letters about this. If you want to get information and directions for handling this glassware, address all communications to Mr. J. A. Ruddick, Ottawa. We have mailed pamphlets to every cheesemaker, and if you have not got this little pamphlet and a blank form, then you had better get it. And if you want any information in regard to when this glassware can be tested, address the Standard Branch of the Department of Inland Revenue. There is no use sending glassware to us, because we do not want it and we cannot accept it. Get the right address, and then send your glassware in. The charge is five cents for each bottle that you require tested.

I was beginning to wonder whether I could get through this address at all or not. I have been talking almost continuously for almost two years, and with the aid of the lantern I am now going to give you some information with regard to cooling cream. The butter industry, especially in Western Ontario, has become very important, and I feel that the dairy division at Ottawa wants to do something to help our butter men, as well as the cheese men, to solve some of their problems.

There is no doubt that in our cream-gathering creameries the quality of the butter depends very largely upon the condition of the cream when it is delivered or received at the creamery. This places a great responsibility on the patrons; a responsibility which, I am afraid, few appreciate.

The question has often been asked, "Can as good butter be made from gathered cream as from cream separated at the creameries?" and the answer has usually been, "Yes, if the cream is properly taken care of at the farms." The question may be asked at this point, "What is good cream?" and most buttermakers would say, "It must be clean in flavor, sweet, smooth, and test over 25 per cent. butter fat."

I am quite certain that to make the finest butter the cream must be clean in flavor, and also that it must be free from lumps or curdy matter, but when it is not pasteurized at the creamery, or no pure culture used, I am not so certain as to the proper acidity or per cent. fat. I will say this, however: we do not want any cream under 24 per cent. fat, or with over .4 per cent. of acid when delivered at the creamery. When the cream is to be pasteurized at the creamery, it is essential that it be in sweet condition (not more than .20 per cent. acid), and that it shall test 30 per cent. fat to get the best results.

In experiments on the care of cream at the farms, carried on by the Dairy Division, Ottawa, during the summer of 1910, we secured some information in regard to the temperatures at which cream must be kept to keep it sweet for different periods.

Mr. Bouchard and myself went out to a farm each, both morning and night, in time to see the milk skimmed, and took entire charge of the cream immediately after skimming was finished. We had an insulated tank made for each farm. These tanks were made to hold six ten-gallon creamery cans each, and deep enough to set all the can under the cover. They were insulated on all sides with four inches of mill shavings and lined with galvanized iron. At both places connections were made with the windmill pumps, so that water could be pumped or run into the tanks at any time. This did not prove satisfactory at all times, as often the water was not cold enough to cool the cream properly. Ice had to be used at one of the farms all the time, as the water was seldom under 58 degrees.

The cellars at these two farms were not in first-class condition for keeping cream in, as the floors were not cement; but they were about as cool as the ordinary run of cellars are in summer.

At one of the farms the milk was skimmed with a De Laval separator located in the stable. As the cows were milked outside, the stable was in a fairly clean condition during the summer months. At the other farm the Department built a small dairy house, 9 x 12 feet, with a cement floor and gutter connected with a drain to carry off the water. The insulated tank was placed in this building and the skimming also done in it, with a Simplex separator.

As soon as the skimming was finished, the cream was divided equally into two shotgun cans and kept in these until the following skimming, when it was transferred to the ten-gallon cream cans used for delivering the cream to the creamery.

When we were experimenting with thick and thin cream, all the milk from each herd was thoroughly mixed before skimming commenced, and when half was skimmed the separator was stopped and the cream screw changed. We endeavored to do the work exactly the same at both farms.

The cream was delivered to the creamery from one farm on the cream route and from the other by the patron himself.

The tests for acidity were made at the creamery usually between 10 and 12 o'clock.

The following table shows the temperature and acidity of cream kept in the cellars for different periods.

Length of time kept.	Average temp. of cellars.	Average temp. of cream.	Average per cent. acid.
	°	°	
36 hrs.	63.7	64.5	.47
60 "	62.9	63.5	.50
72 "	64.0	64.0	.52

The acidity shown here is unfortunately about what is found in many of our cream-gathering creameries during the summer months, and shows plainly that cream cannot be kept sweet for even 36 hours when kept in the ordinary cellars without any additional cooling.

When the cream was left uncovered in the cellars it showed a distinct cellar flavor, but when the covers were put on the cans there was no such flavor.

Temperature and Acidity of Cream Kept in Water and Ice for Different Periods.

Length of time kept.	Average temp. of cream.	Average per cent. acid.
	°	
36 hrs.	50.6	.145
36 "	55.0	.170
36 "	57.5	.190
36 "	58.5	.210
36 "	64.0	.510
60 "	53.0	.150
60 "	55.5	.310
72 "	58.7	.380
84 "	47.5	.165
84 "	54.0	.390

The above figures show that when the cream was cooled to 55 degrees soon after skimming it kept perfectly sweet for 36 hours, or for delivery to the creamery every other day. This temperature can be secured at most farms with the ordinary well water if an insulated tank is used.

To keep cream sweet for 84 hours or for delivery twice a week, it must be kept down to 48 degrees. To do this, ice must be used. The lot kept 84 hours at 54 degrees was cooled in an insulated tank with water from the well at 48 degrees and changed night and morning.

We were able to keep cream perfectly sweet for 84 hours, but it did not have the clean, pleasant flavor which is found on cream kept sweet for shorter periods.

One of the problems in the cream-gathering creameries is to get the patrons to skim a rich cream. In discussing this question at a recent meeting of creamerymen, several of our prominent buttermakers stated that it would be an injustice to the patrons of their creameries to offer a bonus for rich cream, as many of the patrons had separators which would not skim a 27 per cent. cream and do clean skimming. We regret that this is the case, as these farmers are losing much valuable feed for their stock.

What are the advantages of skimming a rich cream?

(1) The buttermaker has a better opportunity to control the quality of his butter.

(2) There is less cream to haul.

(3) There is less cream to take care of at the farm.

(4) There is a greater quantity of skim-milk at the farm for feeding purposes.

The following table shows the benefits of skimming a rich cream in a herd of 10 cows, averaging 4,000 lbs. of 3.5 per cent. milk:—

Total lbs. butter fat.	Per cent. fat in cream.	Lbs. cream.	Lbs. skim milk left on farm.	Extra lbs. skim milk on farm.
1,400	20	7,000	33,000	.....
1,400	25	5,600	34,400	1,400
1,400	30	4,662	35,338	2,338
1,400	35	4,004	35,996	2,996
1,400	40	3,500	36,500	3,500

It is difficult to get every patron interested in the quality of the butter at the creamery, but every one should be interested in retaining all the skim-milk possible on the farm and it is simply surprising how indifferent and careless many are in this respect.

If all the cream sent to our cream gathering creameries tested 30 per cent. fat, it would mean thousands of dollars extra money in the pockets of the patrons from more and better stock, and I am safe in saying that the quality of our creamery butter would be very much improved, as some creamerymen would then pasteurize the cream who cannot do so at the present time, on account of its low fat content and high acidity, which is the natural result of skimming a thin cream, as the following table shows:

Temperature and Acidity of Thick and Thin Cream.

Where kept.	Length of time kept.	Per cent. fat in cream.	Temp. of cream.	Per cent. acid in cream.
			°	
In the cellars.....	36 hours	31.00	65.0	.430
	36 "	22.20	66.5	.540
In insulated tanks.....	36 hours	31.67	57.5	.175
	36 "	22.00	57.5	.195
In insulated tanks.....	60 hours	32.19	55.4	.380
	60 "	21.55	55.5	.440
In insulated tanks.....	72 hours	28.66	58.2	.425
	72 "	20.92	59.2	.340

Note.—The lots in each bracket were skimmed from the same milk. In every case, except one, the thin cream shows the highest acidity, and one would think from the flavor of the cream when it was received at the creamery that there was a much greater difference in the acidity than is shown by the test, as the thin cream always had much the stronger flavor.

Comparison Between Acidity on Cream Cooled in Insulated Tanks and Cream Kept in the Cellars.

	Length of time kept.	Average temp. of cream.	Average acidity of cream.
		°	
Cooled in tank	36 hrs.	.8	.157
Cellar cream	36 "	64.5	.470
Cooled in tank	60 "	53.0	.165
Cellar cream	60 "	63.7	.505

These figures show quite plainly the advantage of cooling cream with water and ice over keeping cream in ordinary cellars.

Temperature of the Water in an Insulated Tank and in an Ordinary Open Tin Tank.

Insulated tank	Tues. morn. 48 deg.	Tues. eve. 53 deg.	Increase 5 deg.
Ordinary "	" " 50 "	" " 68 "	" 18 "
Insulated tank	Tues. eve. 48 deg.	Wed. morn. 52 deg.	Increase 4 "
Ordinary "	" " 48 "	" " 55 "	" 7 "
Insulated tank	Wed. eve. 52 deg.	Thur. eve. 58 deg.	Increase 6 "
Ordinary "	" " 50 "	" " 68 "	" 18 "

The insulated tanks were 30 x 36 inches and 3 feet deep inside, made of inch lumber with a four inch space filled with mill shavings on all sides. They cost $7.50 each.

Quantity of Ice Used in Cooling Cream in an Insulated Tank.

Hours cream was kept.	Lbs. of cream.	Average temp. of weather.	Average temp. water from well.	Lbs. of ice used.	Average temp. of cream.	Average per cent. acid at creamery.
		°	°		°	
36	221	72	53	39	57.5	.18
60	95	73	58	67	53.3	.15
60	120	75	52	56	55.0	.35
72	164	71	53	33	58.0	.36
84	137	75	60	165	48.0	.14
84	132	73	54	164	47.0	.19

In conclusion, let me say that in the production of fine cream cleanliness is the great essential. It would mean a great improvement in the operating of our cream gathering creameries, if all the cream tested between 25 and 30 per cent. fat.

Cream producers must make some provision for cooling the cream, other than setting it in the cellars, if we are going to have sweet cream.

An insulated tank proved a simple, convenient, and effective utensil for keeping cream in.

Cream can be kept sweet for 36 hours by the liberal use of well water at 50 degrees in an insulated tank. It is impossible to keep cream sweet for delivery

twice a week, without using ice. Every creamery patron should provide a supply of ice for cooling the cream.

Q.—What time of the season were these tests made?

A.—From about the 11th of June until the middle of August.

Q.—Did you cover your warm cream air tight as soon as it was delivered?

A.—Yes; I would not say air tight. We put covers on these shot gun cans and on our large cans. When we kept the cream in the cellar and left it uncovered, it had a very strong cellar flavor. When we kept the large cans covered we did not have any cellar flavor. I think a cellar flavor is caused by keeping the cream uncovered in the cellar, because when we covered it, we did not have the flavor.

I would not buy a separator if it did not skim 30 per cent. cream, and did clean skimming. Tell that to the agent when he comes to you and make them give you a guarantee that their separator will skim to a trace and skim 30 or 35 per cent. cream. The men who are using these separators to-day are losing thousands and thousands of pounds of skim-milk every year, and it means a lot of loss to these men, on account of having that skim-milk going to the creameries instead of feeding it to the stock.

Q.—Did you put the ice all in at one time or change the water?

A.—We put ice in every night and morning. We just drop in a chunk of ice about 15 or 20 pounds.

Q.—Did you put the ice right into the water?

A.—Yes, we set the can in the tank and put the water within eight or ten inches, and then put the ice in the water and that will keep it until morning, and then we put in a little more ice in the morning.

Q.—Did you cover the cans with water?

A.—No, we just kept the water up to a little above the cream. Adding ice just as it was needed to keep the temperature right.

Q.—Did you stir the cream at all?

A.—We stirred the cream when we put it into the large cans. We never took any time to stir that cream after. I think it would cool quicker if you stirred it for a while, but we did not do that.

You can keep cream 84 hours if you keep it down to that temperature. I would rather keep it 48 hours. Do not forget what I told you about the time this was tested. This cream was delivered to us in the forenoon, and we tested it for acid about eleven or half past eleven o'clock. If that cream had to stay on a load until five o'clock in the evening it would be impossible that the temperature of that cream would be the same. The temperature would rise about 15 degrees in the ordinary cream cans, and I think the acid would advance nearly .2 in that time.

In conclusion let me say that I believe if all the cream was delivered to our creameries testing always 25 and 30 per cent., that the quality of our butter would be a great deal better than it is to-day. I know that we cannot get sweet cream if we keep the cream in the cellar without any other protection. These tanks cost $7.70 each. I think they cost more than they should. I think you can get very nice tanks made with inch lumber inside. The size is 30 x 36 and filled in with milled shavings. The cream can be kept sweet for 36 hours with ordinary well water in an insulated tank, but if you want to keep it 68 hours you will have to use ice.

Q.—What is the best method to introduce to get patrons to keep cream in that way?

A.—I want to continue this work another year, and, although I cannot promise you everything, I hope to have something to bring before you buttermakers that will be a good deal more conclusive in regard to getting the patrons to do more of that work; because it all amounts to this; that we must get the quality of the butter right. I have not been able to get the quality of the butter to suit me, so I want to continue it another year and see if I can get something as good for the buttermakers as we had in connection with the care of milk for the cheese factory. I believe that the only thing that will make the patrons take care of the cream properly is a guarantee that they will get more money for their butter if they do so.

A MEMBER: I have been hauling cream on my own waggon, and I explained to the patrons that I could save them 35c. more for 100 pounds of 25 per cent cream than I could in 200 pounds of 20 per cent. cream. That is the argument I used to induce them to get better cream. We charged according to the weight of cream hauled away from their place.

MR. BARR: They do not realize the amount of skim-milk they are sending away from their place. You must teach them and show them, they are losing so much good money by sending the skim-milk with the cream, and if you could also show them they are losing in the quality of the butter, then I think you will get better results.

Q.—Can you give me a limit of acid in cream for making ice-cream?

A.—No, I do not know anything about that. Some have asked, what is sweet cream. I might say that I consider for creamery work 2 per cent. of acid is sweet cream. If I was making ice cream, I would want it down to about .165 or .170.

Q.—Do you advise keeping cream at a lower temperature than 48 degrees?

A.—I do not think you can keep it too cold.

Q.—What effect would freezing have?

A.—I would not like to freeze cream for butter making. I cannot tell you what the effect would be. I do not know that you can hurt it by keeping it low, as long as you do not freeze it.

FROM THE COW TO THE CREAMERY CHURN AND AFTER.

PROF. H. H. DEAN, O. A. C., GUELPH.

There are three great factors or forces which determine the fate of nations: Religion, occupation, and education. Of these three not the least important is religion.

Some recent discoveries in Egypt, the "greatest nation of antiquity," indicate that during the period when she was at her best and stood highest among the nations of the world her people worshipped the goddess Hathor, whose image was that of a cow. We are told: "In Egypt, as, indeed in all other ancient and polytheistic states, the gods that were thought to come into closest touch with everyday life, and were most intense in their human sympathies, were ever the most popular."

In a further description of this cow-goddess we are told: "The color is a reddish brown, with spots which look not unlike four-leaved clovers. The head, neck and horns of the cow were originally covered with a very thin coating of gold leaf." We are further informed: "The goddess is represented as suckling a boy and protecting a man who stands underneath her neck. Both of these figures are

no doubt intended to represent the king, the idea intended to be conveyed being that Hathor was the divine mother of the king, that had nourished and was still protecting him."

Although the foregoing facts of history take us back 2,000 years before the Christian era, the symbolic reasoning is as applicable to-day as it was then. Is not the cow the foster mother of the human race to-day? What would become of that most helpless of animals, man, when first brought into existence, were it not for his foster, we had almost said, "divine" mother, the cow? In these times when human mothers no longer consider it "good form" to nourish their infants, what would be the fate of thousands of the human race did not the cow come to their aid and furnish sustenance during that most critical period of man's existence—one to three years of age? In every nation where a decline in cow-culture, (cow-religion, if you like) takes place, a corresponding decrease in human vigor, aggressiveness, and all those things which go to make a nation great and powerful, is manifest. So far as I can see there appears to be a falling off, to some extent, in cow-culture in Canada. If this be true, it is very important that the cause be ascertained and the remedy sought for.

You will notice that the Egyptian cow-goddess had spots "not unlike clover," and that her head, neck and horns were originally covered with gold leaf. There you have the whole story: Cow, Clover, Gold. The historian does not tell us when the gold leaf disappeared from the head, neck and horns of the cow, but we would venture to guess it was about the time that clover-culture declined and before corn-culture was known. Clover-culture, corn-culture, cow-culture, gold for the devotee—these follow as naturally as day follows night, if natural laws be not arrested or caused to deviate from their true course.

The Natural Laws of Buttermaking.

It is very important that we understand the laws or principles of any undertaking in order to insure success. Theoretically the principles of buttermaking from cow to creamery churn, are easily understood; practically they are not so easily worked out. To the man who never owned, fed or milked cows, a production of 300 pounds butter per cow looks as easy as "rolling off a log." To the man who never made butter in a creamery, the manufacture of "concentrated sunshine" in the form of delicious, sweet-flavored bread-lubricant is as easy as to say "Jack Robinson." However, in practice cows have a fashion of disappointing the "revolving arm-chair" farmer; while many a man in making creamery butter has congratulated himself on his skill and judgment before he got his returns from the commission house, butter buyer, or customer.

1. The use of pure-bred dairy sires of butter-producing ancestry which have the power to produce an upward variation in their progeny. In a word, use tried mature males in preference to untried immature animals. The practical difficulty to overcome in adopting this plan, is to be sure that we are getting such animals and that they are free from disease and viciousness.

2. Rearing all the heifer calves possible so far as stabling, feed and labor will permit; testing the heifers by means of scale and milk-fat test and discarding all those which do not come up to a minimum standard of 250 pounds of butter at the end of their second lactation period.

3. Feeding the cows on milk-producing foods such as grass, clover, corn, mangels, oats, peas, bran, and oil-cake, gluten or cottonseed meal. Feed liberally of roughage and of meals according to milk-fat production—6 to 8 pounds of meal

for each pound of milk-fat. The profitableness or otherwise of a ration can be determined only by experiment. Each feeder ought to be an experimenter with *individual* cows, as well as with the whole herd.

4. Maintaining the health, vigor and constitution of the cows by sanitary stabling, which means clean, light, well-ventilated buildings, and cows kept clean by the use of comb and brush, or vacuum cleaners; and a reasonable amount of exercise in fresh air and sunshine.

5. Clean milking, with immediate separation of a cream testing 25 to 35 per cent. fat together with cooling of the same to a temperature of 50°F., or lower, and maintaining the cream at this temperature and also washing of the separator after each time of using.

At this point the separate responsibility of the cow-owner and cream-producer usually ceases and the creamery-owners along with the cream-hauler or transportation company assume a share of the butter burden, except in cases where the cream-producer delivers the cream to the creamery.

6. Given good, sweet, or slightly acid raw material, Canadian buttermakers as a rule, are able to make fine butter, if they have a sanitary building equipped with modern machinery and having an abundant supply of pure cold water. We believe that the system of pasteurization will eventually be quite generally adopted by Ontario buttermakers. Elimination of poor flavors, more uniform salting, and added keeping quality in the butter are points which should receive the careful attention of creamerymen everywhere. Butter scoring not less than 90 to 95 points should be aimed at always and all the time.

After.

Many buttermakers seem to think that when the butter is made their whole duty is performed, but this is not so, unless the cold-storage and marketing are entirely taken out of their hands. Better cold-storages are needed at creameries, but it is more important that butter shall be sent once a week to a co-operative or private cold-storage where a temperature under 32° F. can be maintained until the butter is ready to go into consumption.

Under marketing, I would lay down this general principle to be observed: *Deal as directly as possible with the consumer.* When the history of the selling of farm and dairy products is written next century, historians and political economists will stand in amazement at the wasteful methods of marketing which were so common in the nineteenth and early part of the twentieth centuries. They will ask themselves how it was possible for an apparently well-informed race of people to be so stupid as to allow a class of men (middlemen) to absorb the greater share of the profits on goods manufactured with so much skill upon farms and in farm factories—creameries and cheeseries?

Does it Pay to Allow Beef Calves to Suck Cows?

Some extensive experiments conducted at the Michigan Agricultural College indicate very strongly that there is no profit in producing steers by allowing the calves to suck their dams. The average of three years' experiments with Grade Shorthorn, Hereford, and Polled Angus beefing animals raised in this way showed that it cost 6.73 *cents a pound* live weight to produce beef, while similar calves from similar cows raised on skimmilk and where the cream was made into butter, produced beef at an average of 5.23 cents a pound, while the cows gave a profit

of $27.28 per cow over cost of feed, on their butter. The animals fed on skimmilk made nearly as good gains in live weight as did their companions which sucked their dams, and the cost was considerably less. In a word, the animals raised on skimmilk and meals were sold at a slight profit, whereas those allowed to suckle their dams were produced at a loss except for the manure. The practical lesson for farmers and creamerymen in those sections where calves are allowed to suck their dams is that such cows are kept and such beef is produced at a loss, whereas, if the cows are milked, the calves reared on skimmilk and its substitutes and the cream manufactured into fine butter at the creamery, it would add profit to the farm and help the creamery business. This is an after thought we recommend to the careful consideration of creamerymen. In nearly every creamery section in Western Ontario we have some farmers following the expensive plan of producing beef by allowing calves to suck their dams. There is room for missionary work among such farmers. Full details of the experiments referred to can be got in Bulletin No. 261 from the Michigan Agricultural College, Lansing.

Side Lines.

Profitable "Side-lines" for the creamery man are eggs and ice-cream, to say nothing of buttermilk, the sweet cream trade, casein, hogs and other lines of profit.

The collecting of eggs fresh from the farm two or three times a week by the cream drawers ought to prove a profitable "side-line" for creamerymen. We seem unable to supply our home market for clean fresh eggs. The eggs are fresh on the farm, but we do not seem to be able to evolve a proper system of marketing. The co-operative egg circles are a step in the right direction, but in connection with our creameries we have all the machinery needed for collecting and distributing eggs. Who will give it a trial in Ontario?

We have time for but two other observations. During the hot weather of summer Canadians seem to have developed a mania for eating ice-cream. In many fashionable hotels ice-cream is on the bill of fare all the year. With modern machinery, ice-cream manufacture can very well be made a part of the creamery business, especially where the creamery is located in, or near, town or city. The local demand for ice-cream will frequently pay all the running expenses of the creamery in hot weather. This is no inconsiderable sum in many creameries, and is worthy the careful attention of those studying economy in creamery management.

The value of buttermilk as a healthful, wholesome drink is not sufficiently realized. That there is a pronounced temperance wave sweeping over Ontario all will admit. What shall take the place of the accustomed drinks? Nothing is better than good, wholesome buttermilk. It furnishes the accustomed stimulant in the form of lactic and carbonic acids, at the same time the consumer takes a valuable aid to digestion.

From the cow to the creamery churn is a long road, beset with many difficulties, but these can be overcome by making the road as good as possible, thus shortening the time and improving the product, but much may be added to the profits made along this road by giving attention to some *after* phases of the question, a few of which we have briefly indicated.

A BUSINESS MAN'S VIEWS.

VALENTINE STOCK, M.L.A., TAVISTOCK.

As I rise to address this Association I see before me experts, men and women who have devoted the greater part of their lives to dairy work. I cannot help feeling that it may appear presumptuous of me, a plain, ordinary business man, to attempt to give an address on such an occasion. However, I have at hand two arguments with which I hope to defend myself. In the first place, I have spent the earlier half of my life on the farm when practical dairying was in its infancy; in the second place, I do not presume to speak from the standpoint of an expert, but from that of an outsider, and I hope it will not prove uninteresting to take a glance at dairying from the outsider's point of view.

Before coming to my subject let me say that on my periodic drives every year through the country attending to my own business I note what the individual farmer is doing, and observe with genuine pleasure the improvements and progress made from year to year, especially in methods of stabling, feeding, breeding and handling of dairy herds; in manner of cultivating and storing food, and in preparing and shipping the products of the dairy and the factory; and while I note with sincere pleasure the great progress made during the past quarter of a century, the thought often forces itself on me that by a more general application of business principles a great deal can still be done to make the industry more profitable and pleasurable.

In my humble opinion, dairying is a business, a manufacturing business, and a more intricate manufacturing business than many others. In the so-called factories all kinds of machinery are used to work up raw material into serviceable products. The dairyman, too, has his machinery, converting the raw material which he grows on his farm, coarse foodstuffs, into palatable milk, cream, butter and cheese. Of all his utensils and machinery, the animate, the living machine, the cow, is the most difficult to handle. She is more complicated in her make-up than any mechanical contrivance in any factory. It requires more studying, more common sense, more good judgment to handle the cow successfully than the most complicated factory machine. Men take great pride in being able to handle inanimate machinery, such as lathes, locomotives, engines, automobiles, etc., successfully, but incomparably prouder may the man feel who can handle the animate machine successfully, that is, profitably.

The experts here who by close observation and careful deduction have learnt to handle your animate machine very successfully, will in their addresses have acquainted you with the more successful way of handling her, and I would ask your attention for a few moments to a phase of the industry which I believe is not yet sufficiently valued.

There are certain broad principles which underlie success in various walks of life. My experience and observation satisfy me that the principles which lead to success in mercantile life, for instance, will lead to equal success if consistently followed in dairying. Let me illustrate by a few examples:—

One of the first principles which the merchant must observe if he would be successful, is to study the wants of the community he intends to serve, and then buy and prepare accordingly. He may fill his store with many thousand dollars' worth of goods which, in his opinion, have the finest appearance and are of superior quality, and he may offer them at closest prices, and yet find the goods unsaleable. They are not what his customers want, and

he has to sell them at a sacrifice, if he sells them at all. Applying that to the dairy, no matter how good the quality of butter made in the home dairy or the cheese and butter of factory make may be in the maker's opinion, if it does not suit the taste of the customer to whom it is to be sold, it will bring an inferior price. The lesson is plain, manufacture what the market demands, salted or unsalted butter, white or colored, cheddar or relish, or any other kind of cheese that will please your customers.

Another principle the merchant must give attention to is, the manner of handling and keeping his stock. He must exercise the utmost care in handling his merchandise, observing the most scrupulous cleanliness at every stage lest it deteriorate under his hands and bring him a loss instead of a profit. The observance of this principle in dairying would mean cleanliness anywhere and everywhere where milk, cream, and butter and cheese are handled, and cleanliness with everything wherewith they are handled. In handling the products of home dairies and in my visits to many farms every year I find this principle well observed by many, indifferently observed by others, and the necessity of its observance not at all recognized by some.

Milk is very susceptible to extraneous influences. (This lesson was well impressed on my mind in pioneer days when cows got plenty of leek in the bush in spring and turnip tops in the fall of the year.) Nature well knew how necessary the observance of this principle was when she decreed that it (milk) should not even come in contact with light and air on its way to fulfilling the mission it was intended for, but should pass in the most direct manner from the source of its production to the place of its mission, so as to reduce to a minimum the possibility of contamination, and the resultant reward for obedience to her decree is seen in the well nourished, thriving offspring. From this one learns that in handling milk and its products the nearer one keeps to Nature's law and intention, by avoiding all chances of contamination between the cow's udder and the consumer's stomach, the greater will be one's chances of obtaining the good results aimed at, namely, good profits.

I notice the farmer is frequently read homilies on stables, milk pails, cans and separators, while dusty roads, soured factory surroundings, inside dirty carts and cars, narrow, filthy streets into which unintercepted sunlight never falls, and darkened shops and cellars filled with disease-laden atmosphere are but seldom mentioned. For best results, infection and contamination must be prevented throughout the whole course from cow to consumer.

The careful merchant subjects his stock and premises at certain times to a thorough examination and disinfection to prevent possible loss through investment, by insects (such as moths, buffalo bugs) and other nuisances. Will not the dairyman profit also by periodically testing his herds and disinfecting his stables to prevent tuberculosis, foot and mouth, and other diseases, and harmful odors from gaining hold in them and causing him serious loss? It would surprise many a one to see what a few spoonfuls of creolin stirred into a few gallons of water and sprayed over the animals' quarters, the stalls and gutters, and a few chunks of lime slaked in water and applied to walls and ceilings would do for him.

The would-be successful merchant must know what he is doing, and he does know by keeping account of the transactions not only of his business in general, but by a regular system of accounting (not necessarily a complicated one) in every branch of his business. In so doing he learns not only what his business in general nets him, but also the particular lines which bring him the greatest profit and which none at all. The latter he runs off and replaces with profit-bringers,

and thus makes his whole business profitable. The dairyman's lines are the individual members of his herd. By testing and keeping tab on every member's feed and yield he learns to know the profit-bringers and the unprofitable ones of his herd. The latter he should promptly replace by others of greater promise. No dairyman can afford to waste fodder and time and labor and interest on money invested on an animal that will not yield commensurate returns.

The merchant who does not wish to be compelled to move from place to place at intervals and begin anew where he is not known must establish a reputation for honest goods and honest dealing. I once saw painted on the gable of a church shed, "Honesty is Emil's best policy." (Emil was a jeweller and a watchmaker.) Honesty is also the merchant's best policy. The merchant should never be chargeable with adulterating, short-weighing, short-measuring, and misrepresenting of goods, and it must never make any difference to him whether the father or mother or their servant or their smallest child is standing before him as a customer; whoever appears must get a "square deal." It will also be good policy for the dairyman to deal honestly with everyone with whom he transacts business, all the more so because dishonesty on his part will not only destroy his reputation, but will financially harm those who co-operate with him, and by whose co-operation he expects to benefit. Every dairyman should use in his own making, or, if sending to the factory, send only honest, untainted, undiluted milk; every manufacturer manufacture an honest article; every buyer make an honest deal with patron and market alike. Oleomargarine butter and cheese should never be allowed to be brought into the Province and be branded and re-shipped as Canadian. All interested should co-operate to make Canadian butter and Canadian cheese the favorite in the market, and thus establish and maintain a reputation for the Canadian product.

The enterprising merchant endeavors to become independent of attending circumstances and influences by taking seasonable precautions in order that, whatever be the adverse conditions he may meet at times, they will not upset the course of his business or too disadvantageously affect it.

The wide-awake dairyman will be prepared with supplementary pasture, green fodder and ensilage to tide over possible periods of drouth. He will, by planting occasional groups of shade trees and wind-breaks, enable his herd to protect themselves against excessively hot summer days and against raw winds and sudden changes in fall days. He will be prepared with some kind of spraying mixture to protect his herd in due season against the molestation of flies and insects, so that their energy required for milk production may not be expended in brushing off these pests.

The merchant who would be worthy of the name takes pride in his business, and the dairyman does well to take pride in his. The merchant who does not aim at having the best and neatest store in town, where people can buy to best advantage and receive prompt and courteous service, will not be much of a success as a merchant; and I venture to say it will be much the same with the dairyman. Unless he takes pride in being one of the foremost in his vocation, he will number among those who make the least out of it. The individual dairymen should vie with one another in having the cleanest farm, the tidiest stables, the finest herds, producing the largest quantity and the best quality of milk, etc.; the factory men should vie with one another in making the best cheese and butter the markets call for; and the buyers and shippers should vie with one another in obtaining the best prices for the dairies and factories they buy from.

The merchant lets the public know by judicious advertising that he is ready with seasonable goods to do business with them. It will not harm the dairyman to do the same. There are many ways in which this can be done, as through newspapers, by correspondence, printed wrappers, etc.; but let it be distinctly understood that the neat, attractive, business-like appearance of his premises and dairy and the superior quality of his products will ever be his best advertisement.

The merchant conducting his business on sound business principles looks hopefully into the future; he is resolute and does not allow his determination to flag. He knows as long as others live on earth with him they will require a variety of food and clothing and other necessities of life which they cannot all produce themselves; he also knows that neither can they consume all they themselves produce, so he counts safely there will be an interchange of life's necessaries and luxuries in the future as in the past, and that there will be chips flying off during the interchange for him who facilitates the interchange. And so may the dairyman of Western Ontario who conducts his business on scientific and sound business principles look hopefully into the future. I do not pretend to be able to say what all the future has in store for the live dairyman; but, looking at existing conditions and possibilities and drawing what to me seem reasonable conclusions, I feel safe in saying that the immediate future at least has richer rewards in store for the dairyman's enterprise than the past.

All meats of every description are high in price. Cheese has equal, even greater sustaining value than meat. The consuming population is increasing at a much more rapid rate than the farming population; are we not then justified in concluding that the price of meats, of butter and cheese will not be decreasing, and with meats at almost prohibitive prices and cheese and butter still at reasonable prices, is it not likely that cheese will more and more be substituted for meats, especially on the laboring man's table?

We, here in Western Ontario, are fortunately situated, having to the west of us growing cities with great industries, Sault Ste. Marie, Winnipeg, Detroit; and on the east, Toronto, Montreal, Buffalo, Boston, Philadelphia, New York, and the latter fast approaching in consuming population that wonderful city of old London with nearly 8,000,000 of people. These cities with their ever increasing population will become valuable markets for our dairy products. Their dining-rooms, if I may so express it, practically surround our kitchen, and if we prepare the right article we can serve them at highly satisfactory prices.

If men during the past twenty-five years, with all the inconveniences and lack of fundamental knowledge of the industry, were able to make the industry fairly remunerative and to make such wonderful progress as has been made, how much more should it be possible for the dairyman of to-day and of the future, with all this wonderful progress in the discovery and application of scientific principles at his command, to make the industry profitable? With experiments continuing and with a plethora of literature disseminating scientific knowledge, with splendid herds of high-bred animals (in place of the most ordinary straw-stack herds of pioneer days) from which to draw the foundation for new and highly productive herds; with a variety of mechanical appliances in separators and churns, etc., not formerly dreamt of; with cold storage rooms, with refrigerator cars and fast transportation service; with the city milk trade increasing, reaching out, not five or ten miles, but forty to fifty miles into the surrounding country for its every-day milk and cream supply; with condenseries springing up here and there, which, with the aid of science and a little more experience, will soon be able to send milk in the most convenient form into every part of the world, and in so doing give the

dairy industry an impetus such as it never previously has received; with all these advantages the prospects of the future appear to me better far than those of the past have been.

One thing more: In spite of such prospects, I occasionally meet a dairyman who sees a "bugaboo" in increased competition. To him, if such a one be here this evening, I can only say: "Competition is the life of trade." Increased competition, increased life. "All that other folks can do, why, with patience, may not you?" The dairy products for the year 1909 are valued at $31,000,000, approximately, and if others can get their share of this great sum, why cannot you?

If others can gear their herds up in a few years from an average yield of 3,000 pounds per cow to 10,000 pounds per cow, why cannot you? If others can grow ten to fifteen tons of hay and other green fodder per acre where they formerly grew but two tons of hay per acre, why cannot you? Please read the history of Rev. Mr. Detrich's fifteen-acre farm.

To be sure, the dairyman, like the merchant, who would not fall behind in the race for his share of the $31,000,000 per year, must be up and doing; must be alert and observant, must read and study, and, above all, must without fail attend these Conventions and hear what the practical, progressive men in the profession have to say, then think and digest and apply to his own circumstances. He must keep in line with the procession, must push onward, for "in life's earnest battle they only prevail who daily march onward and never say fail."

Dairymen of Western Ontario, let me say to you in conclusion that from the outsider's point of view, yours is the greatest opportunity ever offered by the world in agriculture. As dairymen you have more incentive to thought and study and education and more encouragement to be energetic than is offered by any other branch of agriculture, or any vocation; and as dairymen and breeders of pure-bred herds you have every opportunity to exercise every faculty of a well-balanced and well-educated mind.

BOOK FARMING.

W. D. Albright, Managing Editor "The Farmer's Advocate," London.

The subject of my address is "Book Farming." Its purpose is to explain some prevalent misconceptions about the relation of theory and practice in agriculture, and to indicate the profit, satisfaction and mental development resulting from the application of sound scientific and business principles in farm practice.

Anyone engaged in agricultural journalism, travelling about the country as we have occasion to do, finds it impossible to escape the conclusion that many farmers are working too many hours a day with their muscles, tiring themselves so that they have not enough mental energy to plan and order their work to the best advantage. I was on the farm of one man last fall who worked from five in the morning till nine or ten at night, and it was no unusual thing for him to drop asleep from sheer exhaustion while milking his cows. By limiting his hours he could easily have smartened his gait and finished his work in an hour less time, if not two hours, leaving him more time for rest, with more energy for reading, thinking, and planning. As showing the chaotic state of his business it is enough to remark that by using a small meal box to feed his cows he was walking an extra mile and a half a year to feed the cow farthest from the bin, and everything else was similar.

There are, of course, extremes in both directions. I used to think my brother employed his head when he might better have been working his elbows. I remember how, when we would be drawing out manure, he would come out to the barnyard in the morning when father and I had the first load pretty nearly all on. Vividly, as though it were yesterday, I can see him standing there on the other side of the barnyard fence, arms folded, red-haired and freckle-faced, gazing complacently at the pile, and drawling out, "Say, Bill, what's the best way to go at that job, start at the top or begin at the bottom and clean it up as we go?" Now, I was one of the kind who would jump in and do the thing first and think about it afterwards, and I used to get fearfully out of patience with Fred for his dawdling habits. Of course he was aggravating at times, for much it mattered where we filled the first few loads of manure. All the same, as I get older and the gray begins to show about my temples, I am coming to develop a sort of sneaking respect for the man who is level-headed enough to make his brains save his back.

Unfortunate Examples of Book Farming. Book farming—what endless rounds of ridicule have been poured out upon that much-abused idea! I suppose the expression calls up to you as it does to me examples of indiscreet young men who, having got hold of so-called advanced ideas, at the agricultural college or elsewhere, undertook to apply them holus-bolus in their own practice, and teach their benighted fathers how to farm! We know the usual result. Sudden investment in big barns, elaborate equipment, fancy-bred stock and a complete upset of the whole system of farm economy threw things out of gear. The father did not take kindly to the new way, and seldom had patience to give it a fair trial, and the son, being nine times out of ten one of those ill-balanced individuals with more enterprise than judgment, inclined besides, perhaps, to carry his head high and cut a dash in the neighborhood, the new ideas panned out indifferently, returns not increasing in proportion to the expense, so that the end of that farm was very likely to be a mortgage sale, with the latter days of the young man employed in business—horse-doctoring or some phase of professional agriculture less exacting than making a good living from the soil. And so "book farming" became a fresh laughing-stock in that locality for a decade, or perhaps a generation.

What Book Farming Really Means. Yet, notwithstanding these many pathetic examples, I submit in all seriousness that Canadian agriculture to-day needs more book farming, and the same principle applies, of course, to that great branch of it which we call dairying. Book farming, as advocated in this address, means simply farming with the aid of the knowledge, suggestion and stimulus contained in books, bulletins and the agricultural press, embodying, as they do, the scientifically interpreted experience of our best practical farmers and dairymen, together with the results of scientific research and public experiment. Agriculture has become too large a subject for any of us to master, and no man who will be a law unto himself can hope to achieve a really broad-gauge success.

A Trade, a Business and a Science in One. Farming has been described as a trade, a business and a profession or science. In primitive days it was almost wholly a trade. Our grandfathers who hewed out their homes in the forest had little science and small opportunity to use it if they had it. Their business, also, was of the simplest character. It consisted chiefly of selling the potash and anything else that would bring cash, and using the money as far as it would go to purchase the barest necessaries of life. Strong arms and stout hearts were their most valuable asset. Common sense, industry and thrift were the main factors in their success. Of course, I suppose that even in those days business ability and scientific knowledge counted for something, but the emphasis was on manual skill and strength. Farming then was mainly a trade.

But times have greatly changed. Agriculture has become complex. Many new problems have had to be faced, and more are coming all the time. Farming is a business, and an intricate business at that. It is so exceedingly complicated that many of us make scarcely any attempt to solve the riddle. We don't figure things down to their last analysis. We drift along, content to believe and guess. It is important that we should know. A good deal has been said again at this convention about keeping individual cow records, but it hasn't been emphasized half enough yet. It is at the very foundation of dairy progress. Not only will it enable the dairyman to select his cows, but better still, it will make him a better dairyman—more intelligent and more painstaking. Strange as it may seem, it will enable him to make more money out of the cows he already has. I found it so in two different herds of which I had charge at three different times. I would no more think of dairying without daily cow records than I would think of dairying without a barn.

But our best farmers to-day do not stop at this. They are keeping books and trying to get at the relation of cost, returns, and profit with each product they raise and each class of stock they keep. It is not easy to do. I have tried it too often to run away with any such idea, but all the same it should be done, can be done, and is being done on not a few farms. Mistakes may be made at first, but these can be rectified and the accounts finally harmonized. He who does this will eventually arrive at a precise, bed-rock knowledge of the business of farming that will make him a more masterful farmer than he could otherwise hope to be. Guesswork must go. Enter the day of accurate farm bookkeeping.

But if the business side has developed, much more has the scientific. New crops, new pests, new conditions confront us. Fortunately the scientist has been busy bringing his knowledge and skill to bear upon these problems and setting forth his findings in comprehensible form so that any man who can read ordinary English may post himself reasonably well if he will. But he need never be afraid of exhausting his subject, and, like Alexander of old, finding no more worlds to conquer. Not only are there many minutely ramifying principles to ferret out, but we have further to consider the immense variety of conditions under which those principles are to be applied. That makes the deduction of applicable principles extremely difficult. Dogmatic utterance is almost sure to be wrong. Moderate statement which takes in the probability of infinite qualification is alone safe. Agriculture a small subject! It is a gigantic subject—gigantic in the visible problems it presents, still larger in the depths to which it penetrates and the breadth to which it extends. The longer we study it the bigger it becomes. It is like an iceberg, one-eighth above the surface, and seven-eighths below.

Where Science Steps In to Aid Experience. And this science of agriculture, when really understood and properly applied, is bound to be of inestimable service. For example, take feeding. There are some dairymen, not usually the best ones, either, who will tell you they know how to feed cows. And so long as they adhere to tried rations they can. But give them a new set of feeds to utilize and they are more or less at a loss how to use them to the best advantage. Here is where the scientist steps in and suggests a ration balanced according to the probable needs of the cow. It may need modification to suit her palate and individuality, but it is at least a basis to work on. Of course, we have heard a good deal of foolish quibbling about precise balancing of rations, but there is no getting away from the fact that an approximately balanced ration is profitable to use. I have yet to hear of the first cow making a great record in milk production that was not fed in substantial accordance with accepted feeding standards. A year

ago, about this time, a prominent dairyman wrote us arguing that it did not make very much difference what meals you fed so long as you had roots and silage. It so happened that the issue in which this letter appeared contained also a letter from a Lambton County farmer who had previously written asking us to suggest an improved ration for his herd of five or six cows. A glance had showed us that the one he had been using was away out of balance. We suggested selling some of his barley and buying oil cake. He did so and reported a month later that he was getting ten pounds more milk a day on a cheaper ration.

Two Kinds of Theory. Before proceeding further, it may be just as well to deal briefly with the common impression that book farming is mere theory, and, consequently a very unreliable guide in practice. In the first place, let me point out that the printed page contains, besides theory, a great deal of accurately recorded experience, so that book-learning and theory are not altogether synonymous terms. In the second place, you will find, on consulting a good dictionary, that there are four or five shades of meaning given for the word "theory." One of these meanings is akin to "speculation," that is "a guess." Another meaning is, "an explanation of the general principles of a science, as the theory of music." This latter kind of theory, when deduced by a really competent and practical authority, is a most excellent and reliable guide to practice. It is the kind of theory we find recorded in our best books along with results of experiment and instances from every day experience.

It would be neither wise nor fair to ignore the fact that in the past there was a common tendency in our agricultural colleges, and in the agricultural press, to publish half-baked theories that amounted to mere speculation. This proved a great handicap to the cause of scientific agriculture, because when one idea advocated by a prominent authority turned out to be impracticable, it made people skeptical about other ideas expounded by other men. I will not say that agricultural teaching is not still tinctured with the germ of speculative theory. It is a very easy thing to get off into the realms of unstable plausibility. But, for the most part, I believe our professional agriculturists have learned their lesson pretty well. In selecting men for such positions, preference is now given to those who have built their education on a foundation of practical experience, and the caution thus ingrained, supplemented by the stress of responsibility, makes them careful to utter speculations as speculations and not as proven facts. The kind of theory now being preached is: conclusions, based on the accumulation of a large body of experience interpreted with scientific insight, tested by experiment, and demonstrated by results. That is the kind of theory you will find in your best books. The farmer or the dairyman with that kind of knowledge is grounded in his business. He is able to meet new problems effectually, solve old ones to their finest conclusions, to encounter difficulties successfully—in a word to master his business.

Two Kinds of Theory Illustrated. As illustrating these two kinds of theory, viz., speculation on the one hand and confirmed conclusions on the other, let me refer first to the aeration of milk. I suppose it looked plausible that milk should be aerated, and some imperfectly interpreted experience seemed to confirm the inference. But, in course of time, out came Prof. Dean, declaring it was a mistake. Still the idea had taken such a hold on popular opinion that it was reluctantly given up, until Mr. Barr's experiments under farm and factory conditions knocked the props out from under the belief and demonstrated that putting the lid on and cooling quickly was the proper way to care for milk intended for cheesemaking. Speculative theory is all right as an hypothesis for investigation, it is all wrong as definite advice.

Now, on the other hand, let us consider an illustration of another kind of theory, the theory that amounts to scientific interpretation of a large body of experience. The Bacteriological department of the Ontario Agricultural College has for some years past been sending out nitro cultures for treating the seed of alfalfa and other legumes to inoculate them with the bacteria by means of which they are able to take up free nitrogen from the air circulating through the soil. These cultures have been sent to a good many hundred or thousand farmers all over Ontario and beyond. Great variation was shown in the published results, ranging from marked increase in growth down to no observable result at all. Experimenters have declared to me on the one hand that nitro culture was just the thing, and on the other hand that it was no good. A leading stockman, a well-read man, too, ridicules the idea. He had grown luxuriant crops of alfalfa on several farms without inoculation. On the other hand, we have heard our stalwart friend, Henry Glendinning, tell about the marked results on his home farm and subsequently on another farm he bought.

Now, in the case of the experimenters referred to, had any one of them assumed that his experience settled the question as to the value of nitro culture, he would have been egregiously astray. When we get all the reports in, and average them up, we find that of those reporting a considerable percentage found a benefit greater or less, while the rest did not. Examining further, we find a reason for the variation in results. We find, for one thing, as Mr. Glendinning has often told us he found, that on farms where alfalfa has grown recently, before or on farms where sweet clover has grown, it is usually unnecessary to inoculate alfalfa seed, as the soil has been already inoculated, the bacteria being distributed from field to field, through manure and other means. But on farms where neither sweet clover nor alfalfa has grown before, inoculation is likely to prove beneficial and is worth trying as a precaution at all events. A number of other conditions liable to affect the results have been also discovered, among these being occasional failure to follow directions, implicitly owing to forgetfulness, carelessness or inexperience.

So, there we have illustrated the insufficiency of personal experience as a guide to practice. Experience is valuable, but no one man's experience teaches the whole lesson. It is the careful, systematic, and scientific deduction by a trained mind working on a large accumulation of representative experience that we should seek to acquaint ourselves with. That is the kind of broad, thorough knowledge we get in good books, bulletins and the agricultural press. To be sure, there are poor books, superficial bulletins, and untrustworthy papers. We should select our reading, choosing only the best. But the right kind of reading will broaden our outlook, deepen and strengthen our understanding, stimulate our minds and quicken our wills to action. Of that kind of "book-farming" we need a great deal more.

Experience—Its Value Indicated and its Shortcomings Emphasized. "Oh yes," said a friend of mine who was in our office lately, "This work you are doing is all right for those who can use it, but I can't read very well. I am not much interested in the scientific side of farming. I have to farm largely according to my own experience and that of my neighbors." Another acquaintance in London told me lately about a young friend of his, down in Essex, who had inherited a fine 350-acre farm. His London friend had urged him to take an agricultural journal. "No, it's no use to me," he replied with the assurance of ignorance. "My, what a chance he has down there if he would only wake up" was our mutual friend's comment. That attitude of mind still prevails in varying degrees all over the country—a tendency to exalt personal experience as being all-important or nearly so, and to look on business capacity and scientific knowledge

as being mere aids, some scarcely conceding them to be aids. There is a rooted conviction that farming cannot be learned from books. Now, that latter proposition I admit. Farming cannot properly be learned from books alone. Moreover, I am not here to disparage the value of practical farm experience. It is of the greatest importance, and I never lose an opportunity of emphasizing that fact. Not only does it develop proficiency in the trade or art of farming, but further, it develops ballast and judgment. It tends to guard against too ready acceptance of sweeping conclusions and plausible theories of a speculative nature. It gives one discrimination and a comprehension of practical difficulties liable to be met with in applying general conclusions to particular conditions. For, as I once put it in print, "Theory is to a certain extent a matter of principles; practice, a matter of details." I was told the other day about a young man in New York State who built a fine dairy barn, up-to-date and complete in every respect. But he found, when he went to put the cows in, that there wasn't room for them to stand on, the platforms were too short. He had been guided by some instructions written by a dairyman who kept Jerseys. His cows were Holsteins. The mistake he made does not in any way discount his ideas about dairy barns, though some of his neighbors would have it so. But it is a conspicuous example of the value of discretion borne of experience. In this and other ways experience is most valuable.

But, while experience is valuable, it is far from being all-sufficient. To enable one to carve out a really broad success, it must be supplemented not only by business ability and science, but by the experience of others. As a matter of fact, there is nothing much more misleading than a limited personal experience. Show me a self-centred man, who is not scientifically informed, who reads little and travels little, and I will show you a man filled with all sorts of erroneous notions. I had a very amusing illustration of it last spring. A milkman walked into our office, and in twenty minutes delivered himself of more nonsense about dairying and cow-keeping than we ever heard from any man before in a year's acquaintance. He began by stating that milk from his old natural pasture was worth 20 per cent. more than milk made by cows grazing on the best clover and timothy. Neither silage nor mangels should be fed to dairy cows, but turnips were just the thing; they gave the milk flavor and "body." Silage was blamed for unthriftiness, indigestion, tuberculosis and contagious abortion. Our friend had used a silo, but discarded it. On inquiry, it developed that his method of making silage was to cut and shock the corn, then, in a month's time, put it into the silo. The idea was to reduce the percentage of acid, which he probably accomplished all right enough, but at the expense of other changes more serious. Corn meal was the ideal grain for milk production, but, he asserted, no cow should be given over a quart a day. Alfalfa, he admitted, was a good thing, if one could get the cows to eat it, but his wouldn't. It turned out that he let the stuff go till in full bloom, at which stage, of course, it makes rather woody and not very palatable hay. In the breeding of cows, his idea was to cross his Jersey grades with Ayrshires, then their progeny with Holsteins, and possibly shorthorn on top of that—an ideal way to breed "thoroughbred mongrels." This, and a great deal more heresy, he unloaded, with the assurance of one who had, as he said, "learned it all by practical experience," while the members of our staff who chanced to be present, listened with amusement. Presently we ventured to inform him that we had all fed silage, and our experience, as well as our methods, had been different from his. We filled the silo within reasonable time after cutting the corn. Likewise with alfalfa, which if cut when a tenth in bloom makes the richest and most palatable hay we have. As for affecting the richness of milk by feed, exhaustive experiments had proved that it could not be

done permanently, except to a very slight extent. The feed will affect the color, though, and that is what he judged richness by. He had never tested a bottle. Of course, silage has nothing to do with causing either tuberculosis or contagious abortion, which are germ diseases. To our great surprise, he began to give in, apparently convinced that we must have known what we were talking about, and that his own imperfectly-interpreted experience was not, after all, the arbiter of truth and dairy knowledge.

It was a splendid example of how misleading a limited personal experience may be. One can go out into the country and prove (?) almost any absurd nonsense with the apparent results of somebody's experience. The fact is, very few people are qualified to draw general conclusions from experience, especially from a limited experience. Unseen factors bias results, and make them seem to indicate what they really do not indicate at all.

The Personal Factor. But, I am reminded, there are some sensible men farming successfully by their own experience. Hold on. Are there? Examine the history and you will find these men adjusting their methods very largely according to the practice of men who read, who attend meetings, and keep in touch with the trend of agricultural progress. What is book-farming this decade is common experience the next, practised very often by men who would scorn to be considered book-farmers. They get their book-learning second-hand. Why, it is only a few years since the advocacy of silos, cream separators, and the use of pure-bred sires were looked on as notions of the book farmers, and the agricultural papers were full of the subject. To-day cream separators are all but universal in our butter-making districts. Silos are going up by the thousand, and no up-to-date dairyman thinks of using a scrub sire in mating cows, from which he proposes to raise calves. Thus has the leaven spread.

But, I hear again, some of these more conservative farmers who adopt improved methods, second-hand, make a better success with them than certain of their more enterprising neighbors, who took up with them first. I grant there are cases of that kind. I maintain there is also a reason. The explanation is found in the personal factor of the equation. After all is said and done, it still remains a fact that in farming, as in any other occupation, the most important element is the man. Upon his native qualities, his judgment, enterprise, thrift, industry, health, business acumen, and so on, depends the success he will make. It is according to the law of compensation that very few men combine all these attributes in high degree. Some have plenty of enterprise, but lack thrift and judgment, and so on. We often find that men with the most enterprise lack balance. The trouble is not with the enterprise they have, but with the judgment they have not. And yet when such men make mistakes and fail it is usual to deprecate their enterprise. We mistakenly attribute to the plus what we should attribute to the minus. It is not the enterprise and book-learning they possess, but the natural endowment of which they are not possessed that accounts for their failure. Better poor methods applied well than good methods applied badly. Let not the level-headed farmer fear enterprise, because some enterprising man fails from lack of judgment, of industry or thrift. Rather let the man with good judgment stimulate also his enterprise by reading and otherwise, and then he will make not only a prompter but a larger and more satisfying success than by adopting progressive measures second-hand.

Good Theories Condemned by Bad Practice. A great many excellent methods recommended on the very best authority are condemned by faulty practice. Good ideas are applied half-heartedly, or applied wrongly without attention to the minute instructions that alone guarantee results. It reminds me of an anecdote I read not long ago.

A country vicar in England was visiting a family where a child had scarlet fever. "I suppose you keep him well isolated?" he asked. "Lor' bless you, sir, yes. He keeps behind that clothes horse, and don't come among us, but for meals."

In hundreds of thousands of cases good recommendations are practised with just about as much chance of effectiveness as this, and when results are disappointing the advice is faulted. Particularly is this true in matters where microscopic organisms are concerned. Instead of being so ready to discount theory recommended to us on good authority, let us rather inquire searchingly into possible defects of practice. For my part, I have always made it a rule before adopting a new idea to satisfy myself that it was sound, to get to the bottom of it if possible. Then, if it did not pan out right, I would dig around to see wherein I had failed to apply it properly. Having discovered a possible cause of failure, I would try again and keep on trying until either successful or convinced that the theory was impracticable under my conditions, whereupon I would proceed to adjust and qualify the theory. For there is no such thing as disparity between correct theory and practice. Sound theory and proper practice must agree. It is merely a matter of adjustment.

A Couple of Book Farmers. Now, just one or two more examples. I have cited examples to illustrate mistakes, let us have one or two to illustrate success. For the first, I am going to wander aside into the domain of fruit-growing. Some eleven years ago a man in Toronto, named Paul Campbell, left the city and bought a farm in Halton County with a couple of orchards on it, one of ten and one of fifteen acres. Renting the farm proper, he applied himself to the care of the orchards, which were in bad condition. The former owner, like his neighbors, did not believe that it paid to spray or cultivate or manure. The year he sold he had about five barrels of fruit from both the orchards. Now, Mr. Campbell knew nothing about orcharding, and knew that he did not know, but he subscribed for agricultural papers and read bulletins and books. He plowed the orchards, cultivated them in the early part of the season, sowed cover crops and got his soil spongy with humus. He also pruned and sprayed thoroughly. A year ago last August he sold the crop from the ten-acre orchard of Spies for $2,500, on the trees! You see the poor man did not know any better than to take good advice. It is a conspicuous example of the benefit of an open mind. Incidentally it points to the fact that many of the best examples of success found to-day are being made by city men who come out to the country with business training, with faith in science, and an eye ever alert for improvement. This attitude of mind soon more than compensates for their initial lack of practical experience.

Just one other example, but a most refreshing one. Down in my native County of Haldimand, last fall, I heard of a case which admirably illustrates several of the points which I have been trying to make. In a certain neighborhood was a comparatively young man named Warren Stringer, a school teacher. Twenty years ago, his father, owing to failing health, offered him the farm if he would come home, look after his parents, and pay off certain shares. Now, Mr. Stringer had no agricultural science whatever, but he did have an inherent liking for the farm and a desire for such knowledge as would make it possible to do better work than his neighbors, and to understand the "why" of things. He attended Institute meetings, subscribed for agricultural journals, and began to practice what he learned as best he knew how. He tried both beef cattle and dairying, but found there was more money for him in the dairy. He kept accounts, practised soiling to supplement his pastures, and built the first silo in his neighborhood. A few years ago there was a farm for sale in the neighborhood, and to everyone's surprise Warren Stringer bought it for four or five thousand dollars. A neighbor offered to loan

him some money to pay for the farm, but he did not need any. Then the neighbors began to sit up and take notice. They are now commencing to follow suit.

I got these facts second-hand, and have given them from memory. They may not be quite accurate in detail, but I believe they are substantially correct. I wrote Mr. Stringer for corroboration and from his own private letter, which displays a most admirable spirit, I cannot forbear to take the liberty of making a quotation:

"When I took hold of the farm, the only implements capable of giving good service were a sulky horse-rake and a spring-tooth harrow. All other implements and tools are practically done for as regards good service. After getting some new implements, paying off certain claims to other members of the family, and buying 25 acres from my brother, I found that the farm of 105 acres, now with just sufficient tools and implements to work it, had cost me nearly $3,000. What I wanted was such knowledge as would make it possible to do better work than the general practice, and also to understand the why of it. In groping about blindly, I made some ludicrous mistakes, but kept right on. About this time I heard of the Farmers' Institute, and attended a meeting of the same, becoming a member, and then for the first time I began to get ideas (knowledge). Soon after this, someone sent me a copy of Hoard's Dairyman, and soon after someone canvassed me for 'The Farmer's Advocate.' I subscribed for both papers, and these, with the bulletins received from the Institute, at last began to open up my understanding. At that time, protein, carbohydrates and ether extract, as well as nitrogen (in relation to agriculture), phosphoric acid and potash, were as so much Greek, and I confess the terms were among the hardest I ever learned; but, by taking one at a time, writing it down, and carrying it in my vest pocket, to be looked at a dozen times a day, and by reading all the available information about that particular term, I came at last to get quite familiar with them all. But now comes in the hard part, to apply the knowledge thus gained in actual farm practice, and here is where I got right in earnest, and received the name of 'book-farmer.' But perseverance brings success, and in time I was able in some measure to apply the knowledge in such a way as to get better returns than those who followed the old ways. Space forbids to mention what took place in connection with growing corn and building a silo (the very craziest thing of all), seeding every crop of grain to clover, etc. Now, you must bear in mind some woeful mistakes were made, and, after growing good crops, I did not always get a proper return for them until I got to figuring balanced rations for dairy cows, weighing the feed, weighing and testing the milk, sending the cream to the creamery, and feeding the warm skim milk to calves and pigs, and studying the advantages of using special animals for special purposes. All this took quite a number of years, and, while I have been farming for twenty years, it is only about ten years since I have made much headway financially, and during this time have fallen short in several instances in making theory and practice work together. One of the things which I received the greatest criticism for was keeping accounts. Everyone, to a man, claimed it was impossible to figure out a profit in farming, but I have always contended that, unless it could be figured out, it was impossible to get a profit, for the reason that a man does not know where he is making profit or loss. My accounts have simply been keeping receipts and expenses, and from this and other data at hand I could tell the cost of a bushel of the different kinds of grains, the cost of feed given each cow, and her production in milk and fat, the cost of producing 100 pounds pork, etc. I would say that a farmer owning 100 acres of land, and putting into practice the teachings of good agricultural journals and bulletins from the experimental stations, and other information to be obtained by an inquiring mind, would not need to think he was doing anything wonderful to clear $1,000 a year above living and running expenses."

Education Through Scientific Agriculture. There is one other point to which I must refer, though I may not dwell upon it as I would like. That is the mental development which comes with a study of agricultural science and economics in their larger aspects. We are getting over the idea that schooling and education are synonymous terms. Intelligent labor is an exceedingly valuable means of education, and incidentally it can be made an invaluable means of child education through the medium of a school-garden and otherwise. The beauty of it is that anyone who studies his occupation has a means of continuing his education indefinitely, leading to larger and larger development, whereas the studies of the school are too often left behind with the class-room, and the mind atrophies for want of vigorous exercise. Scientific agriculture is to be advocated, therefore, on grounds of intellectuality and citizenship. I believe the silo has been an immensely valuable civilizing agent; so of clover, alfalfa and all other good things whose introduction has pried us out of the ruts and caused us to exercise our minds. If agricultural progress were merely a matter of making more money, I would be half-hearted in support of it; for the end of riches is canker and vanity. I believe scientific and business farming will enable us to make more money, to make it more liberally, to achieve a more broad-gauge success in a business way. I hope it will not lead us to save more, for the purpose of earning is judicious spending, reserving, of course, a competence against accident and old age. But my strongest appeal is based on the fact that scientific farming will tend to the intellectual and social development of the farmer and his family. As Solomon says: "Wisdom is better than rubies."

The Summing Up. And so, in the last analysis, it comes down to this: The trouble with agricultural theorizing is that we have had altogether too much poor theory preached, altogether too little good theory practised, and especially not enough good theory practised in the right way. Farming is no longer a mere trade. It is a complicated business and science. We need all the help of scientists, all the help of experimenters, all the help of other people's experience, all the help of reading lectures, and travel, to stimulate, inform and assist. Let us prepare ourselves earnestly to farm well and to live well. Let us read, travel, observe, study, and think, that we may carve out for ourselves a larger, broader success. Above all, let us realize, if we have not realized it long before, that brain power, understanding and knowledge are far more precious than gold.

"SHOW ME."

Dr. G. C. Creelman, President O. A. C., Guelph.

I will endeavour to follow up some of the things that have been so well said with some observations of my own in connection with the life work on the farm. It is so easy for fellows like us who have not much farm work to do of our own to come and give advice to the hard-handed, hard-headed farmers who are working on the farm.

I want to put myself in a friendly attitude with the audience to-night, and to say to you things that are in my mind—to say, rather, things that have come to me in the later years from close observation of the life and work of practical and theoretical farmers, and I hope I will be able to say something of interest to you.

I believe to-day that the curse of the life in the city is its congestion, and I believe just as much that the curse of the life in the country is its isolation,

and we must try to bring these two things just a little closer together. We have so much of God's green earth in this Canada of ours. We have such a large share of it that when we see people in cities like Toronto, London, Montreal, and even Stratford, living close together because the land is sold at so much a foot instead of so much an acre, we wonder at such congestion in a new country. Then we find in the country places people living so far apart and working so hard and they never get close enough together. That is what I want to speak about to-night in the short time that is left to me.

There are two factors, in my mind, that must be pushed to their extreme limit, as far as possible, to help this question of isolation. The first is education, and the second is co-operation. A speaker at the Winter Fair this year said he heard too much about this education business. That word education had been rammed down the mouth of farmers so long that they were not able to digest it all. On the other hand, he made a strong plea for co-operation among farmers, believing that was the panacea for all ills, and he said if they would come together and organize they would solve the whole question.

I believe the Farmers' Institute has had its day, and that stock judging and seed judging are coming in to take its place. We are getting away from talking so much about things, and getting down more to show the farmer exactly how to do things, and helping him to show his neighbor the things which he ought to do. There is a great deal of difference between talking about things and showing men how they should be done.

We do a lot of experimental work on five hundred acres at Guelph, and we do a great deal of demonstrating; and when our farmer friends come to see us in the month of June from all over this Province, I am pleased to say that that carping criticism that we used to hear has passed away. They now come with open minds, and we meet them in the same spirit, I trust, and between us I believe we are assisting one another. (Applause.) I believe we are beginning to get some better methods and better facilities introduced, and the best practice put into use, with the result that the Ontario Agricultural College is on the uplift.

I have no use for the pessimist. I am young, and filled with hot blood, and enthusiastic in my work all the time, and I have no time to talk with the man who says things are in a bad way. I would be a pessimist if I did not say agriculture was on the uplift. I believe we are getting into better shape all the time, and if we push the educational institution we have now and plant some others, I believe there are better things in store for us.

How are we going to go about to get a better system of education? I have two things on my mind which I have worked out in practice and that I think I ought to tell you about. I am a public servant, and it is my privilege and my business to go about the country from county to county, and from township to township. I have been in every township in older Ontario, and I have had an opportunity of observing what has been going on, and I have probably stuck my nose in some places where I ought not to. But I am trying to find out everything that is of use to the people in this country, and in so doing I have noticed that there are some things lacking which might be remedied in two ways. In the first place we have to teach by demonstration the elders just as far as we can. In two or three counties in this Province one or two men have stepped forward in the fruit business, and have made such a success of their own business that their farms become object lessons for their neighbors. The neighbors seeing these men with the same implements which they might have, and the same effort on their part in way of cultivation, have adopted these methods and have reached the same degree of success.

And you know what has happened to the cheese industry in Eastern and Western Ontario since our makers became better educated in their business and since the instructors have come around regularly to instruct and to assist in the manufacture of cheese.

"Show me," says the man from Missouri; and it was never more important in Missouri than it is in the Province of Ontario. And I have found that where we have given practical demonstrations to the farmers we have received every encouragement.

We started out a few years ago to show that one-third of the land in the Province of Ontario did not grow good crops because it was not under-drained. When it was low-lying land on the farm it needed under-draining, and that low-lying land had not been cropped to the same extent as the high land, and therefore it would be found to be the richest land on the farm.

The first year we started out two men, to give the farmers plans of their farms, and tell them where drains ought to go. They also gave the results of work on other farms. The next year we had four men and this last year ten men engaged in that work, and we cannot supply all the men the farmers are asking for to come to them at their farms, at their expense, to give them plans of the farm and how it should be under-drained. At the present time all the tile in the country is practically sold, and five hundred per cent. more have been manufactured than were manufactured ten years ago. That is an illustration of what can be done by a man who is taught to see things by being shown.

I might go on and talk about stock judging courses. I remember going down to a meeting in the town of Lindsay, a place where they have never taken any particular interest in agricultural education and where they have not been particularly progressive. A young man who was put in charge of the work saw there were opportunities there, and he went out among them without any show or pretence and asked the farmers if they would lend him some of their stock to bring into the town of Lindsay, as they were going to hold a practical demonstration. Then he secured Prof. Day and Prof. Zavitz to give addresses. Prof. Zavitz talked on seed selection and many other things in the production of crops. Prof. Day spoke on dairy cattle, beef cattle, sheep, hogs and horses, and then he called men down from the audience to handle the cattle and to give their opinion. In three or four days they thrashed out such a lot of practical things that when the course was on the next year they had so many people in attendance that they had to move from the ordinary small building they first occupied to the opera house, and put the cattle up on the stage. That is an illustration of where you have "Show me you can teach me." We are changing our methods, and are showing rather than talking. This year we are putting on a short course of two weeks in fruit growing for the benefit of men who cannot leave home for any great length of time, and men who cannot go to school any longer. We have a short course of two weeks in stock judging. There are over two hundred men to-night at the Agricultural College at Guelph listening to a talk by Prof. Day on the feeding of cattle, and they will be there for ten days longer. We have a requisition this year for a man to instruct in the packing of apples in boxes, and that request has come so urgently with the money to back it up from the Fruit Growers' Association that we are bringing a man all the way from the Pacific coast to instruct in that work. We used to go to New York State and get men for this work, but the market demands that the thing shall be done carefully; therefore we have to bring a man from California or Oregon, because the fruit growers say, "Show me."

Second, we have to teach agriculture. I have no fight with the Educational Department of the Government of Ontario. They are doing all they can with the system in vogue, and probably all that is demanded of them. But the time has come when the farmer not only says, "Show me; but I want you to also show my children." And there is no reason in the world, so far as I can see, why the study of seeds, weeds, insects, plants, trees, animals, the growing of crops and the handling of cheese and butter should not be taught to the bright minds in the school room. There is no reason why it should not be introduced without interfering very much with the present system of education.

I believe the time has come when the child with the quick mind will pick up these things and put them into practice when he gets old enough. When I attended school I sat on a big seat where my feet would not reach the floor, and was taught that a relative pronoun was one that not only stands for some preceding noun or pronoun, which is called its antecedent, but at the same time joins the subordinate clause which it introduces to the clause in which its antecedent stands. I do not yet know what all that means. (Laughter.) At that time I would have welcomed one chance to climb down off that big seat and go out into the school yard in God's sunshine, and with a little hoe and shovel and rake and line and be taught to lay out geometrically a little plot of land, and spend some time planting seeds, and then gone out every day and watched the plants grow, and watch the insects that came to attack them; and the same way with plants, trees and shrubs. I believe that line of things would be an inspiration to the teaching of other subjects, and the child would want to go on just so long as that teacher and those surroundings were connected with the school. (Applause.)

The time has come when the text books are so plain that the teacher has only to put a text book into the hand of the child, and the child goes through it with the examination and at twelve, or thirteen, or fourteen, passes into the High School, which leads to the University to which the child never intends to go. I want to say to you farmers that it is your fault if you have not these more practical subjects taught in the school, but we must get closer together before we can bring these things about. However, these things are being taught in some schools in the Province of Ontario with a good deal of success. Who is to blame for the situation as we find it at the present time. We have tried for a number of years to introduce agriculture into the public schools. How did we go about it? First, we got Dr. Mills and Prof. Shaw to write text books, but these books did not seem to go, and we believed there must have been something wrong with them. Then we got Mr. C. C. James to write a text book, and it did not seem to go. Why did not they go? Simply because we talked about dealing with practical things, such as giving a balanced ration and dealing with nitrogen, carbohydrates, proteins and potash; and we were asking a 16 or 17 year old young lady, who was proficient in the art of teaching, to get up and teach a class of over-grown boys these subjects that the boys knew more about than she did; because the boys had the practice and she did not have either the theory or the practice.

During the past three years, we have entered into an agreement with the Educational Department, whereby we started at the other end of the business, and we are trying to give that teacher some enthusiasm and education which will enable her to go back into the school room and say: "I have been up to the Agricultural College, and I know something about the common life of the common insect and about common grass and clover. I know that alfalfa will only grow on certain land and requires lime." She could discuss these things with the boys, and she knows where her store of information comes from. She has met with the Minister of

Agriculture and with Mr. Creelman and the members of his staff, and she is going to use these men in the work in her school and ask them to help her whenever she deems it necessary. We have turned out nearly five hundred teachers who have returned to country places, and they are doing this work, and it will be a very important work, and have the most beneficial effect on the rising generation in this great Province.

Mr. Partridge, a member of the delegation who went to interview Sir Wilfrid Laurier, with the farmers from the West, in discussing the western situation the other day at a banquet in Toronto, said that the greatest asset, in his opinion, of the merchant who was doing business was the ignorance of his customers. Is that so? If so, it means that unless we know more about the details of our business and about the handling of our goods we are going to get the worst of it, because of our ignorance.

All the way from Niagara to Hamilton, they are growing fruit. The farms are smaller and the people live closer together. They are having a better time and make quite as much money as farmers in the more scattered areas. They have got closer together, and they have combined and they have improved and co-operated; and as soon as you get co-operation you get four things.

First, they improve the waggon roads immediately, because the people who live close together and are co-operating and talking over their business get on the road question in a very short time. Secondly, they will demand from any Government that they must have rural mail delivery and that quickly, and they will get it. Our Government seems to require a good deal of pressure, but when the proper pressure is brought to bear they do things, even against their will. In the third place, it is not long before they will not only get new ideas, but they will require to do things exactly at the right moment. They get rural telephones in order that they can find if the other fellow has something to sell or something they can borrow from him. They want it right away, and so they try a dozen people, and they can do it all in five minutes. And the fourth thing is, that they improve their transportation facilities almost immediately; because our trolley companies are on the look-out to establish their business where the greatest amount of business is going to be done in every mile, and you find that these things follow one another closely together and the result is getting rid of petty jealousies and they form a co-operative association.

How often do you find that some man who has the interest of the community at heart, and who will collect apples in the neighborhood, and acts as their agent, has a connection in the Old Country, and he represents 50 or 200 people, and he keeps the thing going. He increases the price of their apples from 75c to $2.75 a barrel. Then somebody will find out that he is making 15c a barrel, and they say that it is too much, and they break up the association. That is often the case where a man simply touches it at one point.

Co-operation and intensive farming will break down these local jealousies. And while, in my opinion, the farmer of Ontario to-day is individually the strongest man in the community, as a class, owing to lack of co-operation, they are the weakest. Your boys go to the United States or to large cities in Ontario, such as Toronto, London, and Ottawa, and the first thing you know they are at the head of the business. They have done well, because the Ontario farmer boys are industrious, intelligent, have good morals, and these are the three things that lead to success wherever they go. Your girls go to the United States and become nurses, and the first thing you know they have the charge of a large hospital, because they have the same three strong features that bring success every time. Now, the

people who remain at home have the same blood. The father of that girl or boy or the older brother or sister of that girl or boy have the same strong characters. They are strong individually, and have a splendid intermingling of the English, Irish, and Scotch and German blood in their veins, and that has stamped itself so strongly on our people that we stand out in these three things. But because we have been living more or less monotonous lives on the farm up to this time, when we come to co-operate we cannot do it as we should. I hope the members of the Western Dairy Association will go home and feel that they must form an organization of some kind—a Farmers' Club or whatever it may be. If your trustees are not up to date you should push them forward or push them out. See that your school yards are clean and trees planted, and a little plot made for the children to work in. Start an agricultural demonstration to show the children, and when I come back to you the next time I will hear from you that this work is going on, and will be able to say to you, "Well done." If I can help you by correspondence or personal appearance, I hope you will feel pleased to call upon me. (Applause.)

THE CHAIRMAN: It has been a recognized rule of this Association for a number of years that the new President-elect takes the chair and takes charge of this part of the meeting. I want to say a word or two about the man who has been elected to represent the Dairymen's Association for the coming year. You have all heard the name of Kerwood butter. It is known in every town and city of Western Ontario, and always commands the highest prices of any butter put on the market. And this year we have elected for our President a man, who if he does not make that butter, superintends the making of it. He is one of the oldest members of this Association that we have with us to-day. He told me to-day that he joined the Convention forty years ago, and there are not many men at this gathering who can say that.

MR. WADDELL: I can assure you that I feel proud of the position in which you have placed me, and I desire to thank the members of the Western Ontario Dairymen's Association for the honor they have conferred upon me. The service that I shall render during my term of office will only be limited by my ability. I shall consider myself a servant of this Association for the full term.

PRESENTATION OF PRIZES.

HON. NELSON MONTEITH, in presenting the prizes to the successful winners, said: I can assure you it is with a great deal of pleasure that I perform this delicate task, and I appreciate it very much, coming as it does from the Association to myself unsolicited.

I feel at home with the dairymen of Western Ontario. I have done service with them on a hard-fought field, and I find the dairymen of Western Ontario to be men thoroughly alive to the necessity of their calling—men big enough and broad enough to look at the whole question from a broad statesmanlike standpoint.

When holding the office of Minister of Agriculture a few years ago I was waited upon by representatives of the Western Dairymen's Association. They had in mind a momentous change in their operations in the matter of inspection and instruction work, and they asked for my assistance in order to bring about that change which they believed would be of advantage to their calling, namely, general instruction and inspection of the factories throughout Western Ontario. They were the pioneers in this great work. Hitherto it had been paid for by factory-

men, and it was felt that this was not uniform. The proposition was threshed out, and we finally came to a basis upon which we agreed that instructors should be engaged, whose duties it should be to visit all the factories, and instruct the makers in the best practices of their profession. We went even farther than that, and felt rather anxious lest we should interfere with private institutions as a Government. However, I felt that with such a body of men as the dairymen of Western Ontario I was on fairly even ground to take this matter up, and you know they have now in force throughout this district inspection and instruction work in a way that has brought about results. I was proud as I went through your exhibit to see the marked advance that has come about in the finish and quality of our cheese during the last few years. It is an inspiration to our young makers and to their credit that they should turn out such fine cheese.

I must congratulate those who have had this convention in hand for having had everything so nicely arranged, and I believe the citizens of Stratford have appreciated it very much.

Mr. Monteith then handed the various trophies to the respective winners, with appropriate personal remarks.

The recipients of the prizes made suitable responses. It turned out that Mr. Penhale, of St. Thomas, winner of the first prize for a dairy farm, was a former schoolmate of Mr. Monteith at London.

Mr. E. G. Henderson, of the Windsor Salt Company, said: If I were a preacher and wanted a text, Dr. Creelman has supplied me with it. He said several times, "Show me." That is the object of the Agricultural School at Guelph—it is to show things. It is an object lesson to Ontario and, in fact, to the whole world.

I have been attending these Dairy Conventions, East and West, for the last eighteen years, and I have heard considerable talk and a lot of theory; but only during the last three years have I been shown anything. This Association is here to show, and this Convention has been a splendid demonstration to the farmers and cheese men and dairymen of what good cheese and butter ought to be.

Mr. Cowan, who represents *Farm and Dairy*, has done something which I think of value. He originated the Farm and Herd Competition amongst the dairy farms of Ontario, and the result, I am sure, is something that every one must feel proud of. It has done incalculable good to the whole Province.

The time has gone by when the people look down on the farmers. The city people want to go out to the farms. They do not want to stay in the city if they can get out in the country. And after all the farmer is one of the greatest and one of the most scientific manufacturers in the world. And the manufacture of butter and cheese is one of the most scientific forces in the world. The animals on his farm are the machines, and he gets his power from the soil. He manufactures a product that is not equalled by any other in the world, and he requires a skill superior to that of almost any other manufacturer.

There are one hundred and fifty things around a farm that an ordinary man knows nothing about, and a farmer requires to be skilled in all these things in order to be successful. He then presented the prize won by Mr. Richardson for his dairy farm.

J. W. Richardson, among other things in his reply, made these practical observations: As a family we are more than satisfied with our success in winning the second place in our Province, and I am pleased that this beautiful cabinet of silver comes to Haldimand County. I also congratulate Mr. Penhale, and I think he deserved the prize. We also thank the judges; their task was a difficult one, considering that they had to judge the large and small farms on the same score.

This competition has been an education to us. We have found out some of our weak points. In these we hope to improve. "Riverside Farm" is situated three miles west of Caledonia, on the banks of the Grand River. It contains now 550 acres, and it is forty years since my father purchased the first hundred acres. He was one of a large family, and when he started out his funds were low, so he purchased a farm as low in price as possible. It was pretty well run down, as wheat and barley had been grown extensively and sold off the farm for some years. His aim was to build up the farm, pay off the mortgage, and make a home for himself. Since that time the farm has been gradually built up, and one of the items in the building up of the farm was the growing of alfalfa. It is thirty-four years since it was first sown on the farm. The first three or four years we were not successful, but we continued, and for a great many years alfalfa has been grown successfully.

At first it was grain-growing, and then beef-raising, but the profits were low. Twenty years ago we began weighing our milk, and found our returns so low from a beef and dairy herd that we decided to specialize, and began at once to breed a dairy herd. We selected a pure-bred dairy sire to head our herd, and weeded out the beefy cows and poor milkers. Our aim has been to build up a first-class dairy herd by proper selection and breeding, and by securing the best sires possible to place at the head of our herd. Some of the champion producers have been raised and gone out from Riverside Farm. For thirty years we conducted a home dairy and made cheese, but for the last five years we have sent our milk to the cheese factory in summer and to the creamery in winter.

In dairying you increase the fertility of the soil, and by doing so are able to feed two cows or feed them better on the same land than by feeding one. The main features of our farm operations is the production of alfalfa, clover, roots, and ensilage, and in that way we lower the cost of production.

REPORT OF COMMITTEE ON RESOLUTIONS.

We have pleasure in presenting the following resolutions:

1.—That we the members of this Association desire to express our appreciation of the kindness of the Mayor, Council, and Board of Trade of the city of Stratford in furnishing the free use of the City Hall for the Convention and Heinbuch's Hall for the Dairy Exhibition, and we also wish to extend our thanks to the citizens of Stratford for the kind reception they have given us.

2.—Whereas, the success and educational value of this Convention is due in a marked degree to the splendid addresses given by the various speakers, we desire to express our appreciation of their efforts and extend to them our sincere thanks for their assistance.

3.—That the thanks of the members of this Association are extended to the press of Stratford and other cities for the excellent report given by them of this convention.

4.—That the thanks of the members of this Association be and are hereby tendered to the Canadian Salt Co., of Windsor, Ont., through their General Manager, Mr. E. G. Henderson, for the very handsome badges presented by the company to the Association.

5.—That the thanks of the members of this Association be and are hereby tendered to the Heller & Merz Co., New York; R. M. Ballantyne, Limited, Stratford; C. H. Slawson & Co., Ingersoll; The J. B. Ford Co., Wyandotte, Mich.;

Canadian Salt Co., Windsor; Western Salt Co., Mooretown; Ryrie Bros., Toronto; Imperial Bank of Canada; C. C. James, Deputy Minister of Agriculture; and the Marshall Dairy Laboratory, Madison, Wis., for the special prizes kindly donated for our Dairy Exhibition.

6.—That as dairymen we are under great obligations to the Ontario Department of Agriculture for assistance rendered the dairy industry through legislation, the establishment of Dairy Schools, grants to the Dairymen's Association, the excellent system of dairy instruction provided, sending speakers to attend annual meetings of cheese factories and creameries, and aiding in every way possible this great industry. We wish to express our sincere thanks and appreciation of this work.

7.—That we as dairymen desire to place on record and express our appreciation of the work of the Federal Department of Agriculture, relative to the assistance given the dairy industry through establishing the cow testing associations, experimental work, legislation, and in many other ways assisting the dairy industry.

8.—That this Association extends thanks to the different railways for giving delegates reduced rates from all points to Stratford.

THE CHAIRMAN: I feel that I cannot lay down the reins of office without expressing my gratitude for the co-operation of the dairymen for the past year. We have from every source received the greatest co-operation and help, and you will have noticed in the chart which Mr. Herns has shown you at this convention the immense amount of work that has been accomplished by the assistance of cheese-makers and patrons by the data he has gathered. And as President of the Association for 1910 I feel grateful to all those who have taken part and helped to make the work of our Association a success, and especially to the Directors who have been associated with me during the past year.

In all the years that I have been a member of the Board of Directors I think every member of that Board has worked for the best interest of the dairy business of Canada, irrespective of faction, party, or creed, and during the past year it has been appreciated by me. I therefore want to thank the men who have been associated with me on the Board very heartily for their assistance.

The Convention was then declared closed.

REPORTS OF THE DAIRY SCHOOLS, 1910-11.

EASTERN DAIRY SCHOOL, KINGSTON.

SESSION OF 1911, JANUARY 2 TO APRIL 7.

Director—GEO. A. PUTNAM, B.S.A., Parliament Buildings, Toronto.
Superintendent—G. G. PUBLOW, Kingston.

Staff of Lecturers and Instructors.

G. G. PUBLOW..... Lecturer in Cheesemaking.
J. H. ECHLIN ..... Instructor in Cheesemaking
D. J. CAMERON..... Assistant Instructor in Cheesemaking
L. A. ZUFELT..... Instructor in Separators and Buttermaking.
W. W. DOOL..... Assistant Instructor in Buttermaking.
IVAN PUBLOW ..... Assistant Instructor in Separators.
J. F. SINGLETON..... Instructor in Milk Testing.
J. A. CRAIG..... Engineer and Instructor in Boilers, Engines and Pipe-fitting
W. T. CONNELL, M.D..... Lecturer in Bacteriology.
W. O. WALKER, M.A..... Lecturer in Chemistry.

The regular long course of the Eastern Dairy School for the current year opened on Jan. 2nd and closed March 25th, being a period of twelve weeks. During this term 74 students registered, 29 of whom took the full course, the remainder staying for varying periods of from two to four weeks.

The day's work at the school was started at 9 a.m. with a lecture of one hour's duration as per following time-table, after which the students were divided into three groups for practical work, one going to cheese-making, one to butter-making and the other to milk-testing, where they spent three days before moving on to the next department.

LECTURE TIME-TABLE.

9 *a.m.* to 10 *a.m.*	3 *p.m.* to 4 *p.m.*
Monday—Cheesemaking	Discussion—Cheese.
Tuesday—Mathematics	Buttermaking.
8.30 *a.m.* to 10 *a.m.*	
Wednesday—Dairy Chemistry	Butter judging.
9 *a.m.* to 10 *a.m.*	
Thursday—Cheesemaking	Dairy Bacteriology.
Friday—Buttermaking	Cheese judging.
Saturday—Cheesemaking	Veterinary Science or Care and Management of Boilers and Engines.

In the Cheese-room the students were taught the latest up-to-date methods in the manufacture of cheese. Small vats holding about 325 lbs. of milk are provided and a student placed in charge of each and given one or more assistants. At first the Instructor in charge demonstrates the proper method and afterwards simply watches the progress of the work and points out mistakes that are being made and how they are to be avoided in future.

In the Milk-testing and Butter-making departments much the same methods are employed as in the Cheese-room. Most of the students are more or less familiar with cheese-making, but very few know anything, or at least very little about making butter or testing milk, and it takes them several days or weeks before it

would be safe to allow them to take full charge of the various machines and utensils. For this reason the Instructor has first to show the students how to work and get them accustomed to the handling of the various utensils.

A casein test was added to the equipment of the Milk-testing department, but was received too late to enable us to do much research work outside of getting familiar with its operation. Its manipulation is but slightly more complicated than the Babcock, and any careful person who is familiar with this latter test should have no difficulty in learning to operate the casein test in a few hours. There is this difference, however, temperatures play a far more important part in the correctness of the result in the casein test than in the Babcock. The strength of the chemicals used also has an important bearing on the results obtained. The appearance of the test after it is made is no guide to its accuracy, as an improper test presents the same appearance as one that has been correctly made. The only means the operator has of being sure of the result is by duplicating the test and conforming as closely as possible to the instructions sent with the test. The result of the small amount of work we did in determining the casein content of the milk in relation to the fat and amount of cheese made was rather surprising, but owing to the limited number of tests and the abnormal condition of the milk, we feel we would not be justified in giving out this knowledge until we have been able to do the work under more normal conditions than exist at the school in the winter season.

In the Butter Department an attempt was made to study the moisture content of the butter, and how best to control it with the least injury to the quality. As our butter equipment is limited to one large and one small churn, it was impossible for us to do any comparative work which would be at all valuable, owing to the too many varying conditions present at each trial, which made it impossible to attribute the difference in the result to any one definite cause. Some of the observations made, however, were as follows:—

A churn of large diameter has a tendency to expel more moisture than one of small diameter.

The more nearly the churn is operated at its full capacity, the more moisture is retained and *vice versa*.

Butter made from rich cream usually contains more moisture than that made from cream having a smaller fat content.

The length of time taken to gather the butter into granules of sufficient size after their first appearance affects the moisture content. The longer the time the less moisture, and the shorter the time the more the butter will retain. Anything, therefore, which affects the length of time in churning at this particular stage will affect the moisture content.

High churning temperatures tend to increase the moisture.

Additional moisture may be added to the butter by working it in the presence of water. The longer the working, especially at high temperatures, the more is incorporated. In this connection we found that the maximum amount of 16 per cent. could be incorporated by working the butter in water at the ordinary washing temperature without in any way injuring the texture and body; while if high temperatures were employed these qualities of the butter were nearly always adversely affected.

We found that the amount of salt used had to be changed when giving butter the foregoing treatment. As all the excess water had been expelled, very little

salt was lost in *brine* as formerly, and we were able to incorporate all the salt and thus have more perfect control of the per cent. of salt we wished to incorporate.

The milk supply for the school was adequate for all purposes, in fact much difficulty was met with in keeping it within bounds so as not to exceed the appropriation for this purpose.

At the close of the regular course a short course for Instructors was given of one week's duration, at which all the Instructors employed among the cheese factories and creameries in Eastern Ontario were present. This was more for the purpose of organization and imparting any new knowledge obtained during the past year and for general discussion.

L. A. Zufelt, Acting Supt.

THE ONTARIO AGRICULTURAL COLLEGE, GUELPH, ONT.

Staff of Lecturers and Instructors.

H. H. Dean, B.S.A.	Professor of Dairy Husbandry.
S. F. Edwards, M.Sc.	Professor of Bacteriology.
D. H. Jones, B.S.A.	Lecturer in Bacteriology.
H. L. Fulmer, B.S.A.	Lecturer in Chemistry.
A. McKay	Chief Instructor in Cheddar Cheesemaking.
Geo. Travis	Asst. Instructor in Cheddar Cheesemaking.
R. W. Stratton	Instructor Cream Separators.
F. Dean	Instructor Buttermaking.
G. Rickwood	Instructor Milk and Cream Testing.
Miss Laura Rose	Instructress Farm Cheese and Buttermaking.
N. S. Goulding	Instructor Farm Cream Separators and Soft Cheesemaking.

The total number registered during the Dairy School term of 1911 was somewhat less than for the previous year. The number writing on the final examinations was 32 this year, as compared with 33 last year. We should like to see a larger number availing themselves of the course of Dairy Instruction given during the three months of January, February and March of each year. We could doubtless popularize the course by making it much shorter, say three to six weeks, but we feel that twelve weeks is all too short a time for the work to be covered. Thirty-two students well grounded in the theory and practice of dairying we believe to be more valuable than having a larger number with only a smattering of dairy science and art. A few of our students failed in Dairy Bacteriology. As this part of the term's work is rather difficult for those having no scientific training, and more particularly for those lacking a public school education, some have thought Dairy Bacteriology and Dairy Chemistry ought to be withdrawn from the course. We do not favor this suggestion, believing that these two sciences are at the foundation of intelligent dairy practice. Not long ago we received a letter from a former student, who asked us to advise the "Boys" to stick to Bacteriology and Chemistry, as he had found them of great practical value since taking charge of a creamery.

During the Dairy Instructors' Course we had a free and frank discussion of Dairy School work—as to what improvements could be made in the course, and how a larger number might be interested in the School. We hope to profit by the suggestions of those who are meeting the men in the factories during the summer season, and know their wants better than we who are located at the College, and are more or less out of direct touch with makers and helpers in the creameries and cheeseries of the Province.

Changes in the Staff. Mr. Geo. Travis, Tillsonburg, took Mr. C. H. Ralph's place as Assistant Instructor in the Cheddar Cheese Room. He also gave the instruction in piping, soldering, boilers and engines, as he had done in former years. For 1912 it is expected that Mr. Travis will take Mr. Stratton's place as Instructor in the cream separator branch of the Dairy School, Mr. Stratton having resigned to go into business in Guelph. The School loses a faithful Instructor in R. W. Stratton, who has been on the staff about sixteen years.

Mr. G. Rickwood, of Beachville Creamery, a graduate of the 1910 Dairy Class, took Mr. M. Robertson's place, who was announced as Instructor in Milk and Cream Testing, he having been appointed to succeed Mr. Taylor. In the meantime Mr. Robertson accepted a more lucrative position in the United States, and it was necessary to make another change when the session opened.

Mr. N. S. Goulding, of Midland Agricultural College, England, succeeded Mr. Rice as Instructor in Soft and Fancy Cheesemaking, taking also the hand separator work, and milk and cream testing with the Farm Dairy Class.

Miss Rose gave most of the Dairy Instruction to the Macdonald Institute Class. This class numbered about twenty-five, making a total attendance at the School during the term of about seventy-five students.

Work Done During the Term. Lectures for three-quarters of an hour each morning, and for the same length of time each afternoon except Saturday, dealt with the more scientific phases of dairying. The remainder of each day, except Saturday afternoon, which was devoted to a meeting of the Literary Society, was given up to practical demonstrations in cheesemaking, running cream separators (power and hand), churning, testing milk and cream, laboratory work in chemistry and bacteriology, together with practical lessons on mending tinware, piping and valve repairs, firing the steam boiler, running the engine, etc. In this way we aimed to combine the theoretical and practical branches of dairy instruction.

The judging of cheese, butter and cultures (starters) is given considerable prominence during the term, as we think students ought to know what constitutes good cheese and butter, as well as know how to produce them. As cultures (starters) play so important a part in cheese and butter making, students make and judge these until they are thoroughly familiar with the best method of propagating them, and know their good and bad characteristics.

During the Instructors' Course, held for one week at the close of the Regular Dairy School Session, a practical demonstration in judging cheese and butter was given by Robt. Johnston, Woodstock, and addresses were given by Messrs. G. A. Putnam and Anson Groh. The main feature of the course was a Tuberculosis Demonstration, under the charge of Prof. Edwards, College Bacteriologist. This class also spent considerable time in the Chemical Laboratory with Prof. Harcourt and Mr. Fulmer, and were given two lectures on Cold Storage by R. R. Graham, B.S.A., of the Physics Department.

H. H. DEAN.